

Current History

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Current History

JULY, 1970

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In this issue seven authors discuss the increasing devastation of the American environment and the ways in which it came about. Our first author says ". . . the historical roots of our ecological crisis must be sought in the history of how our present attitudes toward nature and our fellow men came into existence."

Our Ecological Crisis

BY CARROLL QUIGLEY

Professor of History, Georgetown University

I: DEFINITIONS

“ENVIRONMENTAL POLLUTION” has many meanings, but essentially they all boil down to the movement of objects by human action from places or conditions where they are natural or unobjectionable to places or conditions where they are unnatural, objectionable, and injurious.

There are many degrees of environmental pollution ranging from the least objectionable to the most injurious. These degrees of pollution could be divided into four great classes.

Class I consists of movements of objects from places where they are unobjectionable to places where they are objectionable, without being injurious to safety or life. Topsoil is valuable in the garden, but it is objectionable on the dining room tablecloth. A can of beer inside the refrigerator is good, but an empty beer can on the White House lawn is an example of Class I pollution.

On the whole, Class I forms of pollution are objectionable from the point of view of taste or aesthetics and are not injurious to health or life. But many objects which are

out of their proper place—like roller skates left at the top of the cellar stairs or a razor left where a child can reach it—are potentially a threat to human safety and perhaps to human life and thus would fall into Class II, that is: objects out of their proper place and thus likely to be injurious to safety or to life.

The difficulty with Class II pollution is that some people would interpret the expression “injurious to safety or to life” to apply only to human life, while others would apply it to other forms of life as well. Thus the use of insecticides and weed killers on the lawn may not injure human beings and may not injure worms who ingest these poisons. The worms may be able to go on indefinitely making topsoil, even when they are full of DDT, but this condition may kill off all the robins who eat the worms. Some people would say that lack of robins is only an aesthetic loss and only a loss to those persons who happen to like seeing robins. But others argue that no one knows exactly how all the different forms of life fit together and are interdependent, including man, so that we have no way of being sure that the loss of

robins and many other forms of life from DDT, including sea birds and some hawks (such as ospreys), may ultimately be very injurious to human life. At this point we begin to reach the more complex and less known aspects of environmental pollution, the ecological aspects.

Ecology is concerned with the interrelationships between natural environment and living forms, a process in which one form is dependent upon the continued survival and operation of other forms, even when we are totally unaware of the relationships. For example, the ability of some grass-eating animals to digest cellulose in the fodder may depend on the actions of bacteria in their stomachs, which break up the vegetal materials. If man were dependent on these grass-eaters for food, as some nomadic tribesmen are and as some American steak eaters seem to be, then men would be dependent on the bacteria and could not live (or, at least, could not live as well) if environmental pollution killed off the bacteria in the stomachs of herbivores.

Class III pollution is concerned with the disruption of ecological relationships and the complex balanced interrelationships of living forms within the natural environment. These relationships appear as long chains in which one form of life depends on another which, in turn, depends on a third, which then depends on a fourth. Thus, for example, man may be dependent on beef which is dependent on grass and corn, which is, in turn, dependent on topsoil, which may be dependent on worms, which may be dependent on all kinds of things, including bacteria.

Such chains of life also have side links which join them together into a complex multidimensional network. In this network, each living form has an "ecological niche" in which it can survive. Such a niche is an area with rather narrowly defined conditions within which that particular form of life can survive. These conditions are created and maintained by all the surrounding natural conditions, both living and non-living. There is a close interrelationship of these

two: non-living conditions like temperature and rainfall not only influence the forms of life but are influenced by them, as both temperature and rainfall are influenced by the prevalent forms of vegetation. Any change of conditions anywhere may make life impossible for a living form somewhere else because of these pervasive ecological interrelationships. The disturbance of these relationships make up Class III.

If we look at living forms as a whole in all their interrelationships, we see that they form a pyramidal hierarchy with soil, bacteria, worms and other invertebrates on the lower levels; many species of vegetation on somewhat higher levels; somewhat fewer species of herbivorous vertebrates on an even higher level, and considerably smaller populations of carnivores near the top levels, with man, as the culmination of the evolutionary process, at the apex. In this pyramid of life we have not only a representation of the evolutionary sequence, with later forms of life at higher levels, but we also have a system of ecological dependence in which the higher levels are supported by the lower ones. The interrelations among the levels go in both directions with materials being processed upward to higher levels from lower ones at the same time that dead individuals or their waste products are being broken down to lower levels where they become available as materials for repetition of the building-up process. Thus materials are constantly flowing in both directions in the biologic pyramid of life, upward by aggradation of materials to higher forms of life and downward by degradation of materials to lower forms of life. The process of degradation through decay and disintegration, by the activities of bacteria, parasites, termites, worms and many kinds of "pests," is just as important as the process of building up. Men tend to resent the processes of decay and degradation and do all they can to prevent them by killing those living forms which are performing this essential task (the parasites, termites, worms and "pests" just mentioned) but also by changing materials which can be degraded by natural processes (such as wood and paper)

into materials which cannot be degraded, or can be degraded only very slowly (like plastics, detergents, rustless metals) by any natural processes.

This brings us to Class IV, the last (and final) kind of environmental pollution, in which human actions begin to interfere with the fundamental cyclical processes of nature on which all life depends. There are many of these cycles, of which the aggradation and degradation of materials within the pyramid of living forms is only one. Others include the hydrologic cycle, the heat cycle, the nitrogen cycle and many others.

At the present time, students of environmental pollution are becoming increasingly worried that, by interfering with these basic cyclical processes of nature, human actions may make life impossible not only for all, or most, men, but also for other higher forms of life. For example, the oxygen-carbon cycle is the process by which plants take in carbon dioxide, break it up, and release atmospheric oxygen which, in turn, is breathed in by animals who breathe out carbon dioxide. Much of our atmospheric oxygen comes from the activity of microscopic plant life in the oceans. If these oceanic microflora are killed off as we pollute the seas, the flow of oxygen from the oceans to the atmosphere might be reduced, leading to a reduction of the oxygen content and an increase of the carbon dioxide content of the atmosphere. Not only would this make it more difficult for higher animals, including man, to breathe but it might lead to dangerous distortions of the heat cycle and the hydrologic cycle.

The heat or thermal cycle is based on the contribution of heat made by the sun and other sources each day to our globe, especially to its atmosphere. As it is dissipated into space again, this heat is a major factor in our weather cycles. We have already seriously disturbed the thermal cycle by our destruction of vegetation and our burning of fossil fuels, which increase the carbon dioxide in the atmosphere and disturb the natural patterns of rainfall. If atmosphere heat were to increase only a few degrees, much of the snow and ice in continental and polar glaciers

might melt, raising world sea levels a few hundred feet, and flooding many of the world's major cities.

The hydrologic cycle is concerned with the process by which water is evaporated from the earth's surface (and especially from the ocean's surface), rises into the atmosphere, condenses into rain or snow (usually over land), and slowly makes its way back to sea level through snow-capped mountains, glaciers, ground waters, and surface streams. In some cases, it takes thousands of years for waters to complete a single cycle of this process. But over that period these waters are available for the living processes of many forms of life, both plants and animals. Man's interference with this process, both consciously but even more by his unconscious activities, has already gravely damaged this hydrologic cycle, speeding it up, eroding mountains and topsoil into the seas, creating man-made deserts, destroying wet lands (and much of the life which depends on them), driving ground waters to lower and often inaccessible levels, and filling all of these waters with death-dealing and life-destroying pollutants in the process.

In summary we might say that environmental pollution is an accelerating problem by which man violates the quality and ultimately even the possibility of human life. The four stages in which it may be divided are:

Class I in which the amenities and aesthetic qualities of life are violated.

Class II in which there is injury and death to individuals from environmental contamination.

Class III in which whole species are threatened with extinction from disturbances of ecological inter-relationships.

Class IV in which fundamental cycles in the biologic pyramid and its natural environment are distorted or destroyed to such a degree that life for whole series of living forms becomes impossible over wide areas and possibly over our globe as a whole.

It is worthy of note that these four classes, based on a study of our biologic system, are also chronological, in the sense that man's activities of this kind began with Class I while he was still a primitive creature, passed

on to Class II long ago, are now in Class III and are moving with constantly accelerating speed toward Class IV.

II: ROOTS OF THE CRISIS

The origins of our ecological crisis are usually sought in the history of technology. Any careful examination of the subject, however, reveals that advancing technology is not a cause of the crisis, or historically antecedent to it, but is rather a part of it. Accordingly, the roots of the crisis must be sought elsewhere and could be formulated by such questions as this: "Why does our technology take such ecologically disruptive or destructive directions?"

This question leads us to problems of two kinds. One of these concerns our outlook and value systems; these determine what we want and what we admire. The other concerns organizational questions, that is, the patterns of behavior in our society which form it into a functioning social system, together with our technology on one side (determining what we can do) and our outlook and value systems on the other side (determining what we will want to do). These three aspects of our society form a social system that is now ravaging our natural environment and has been doing so for several centuries with increasingly disastrous consequences.

From this point of view we must see our ecological crisis in terms of four interrelated aspects:

1. The natural environment viewed as an ecosystem, especially that part of it now known as the biosphere.

2. The technology and artifacts which man has turned into a buffer area between man as a natural living form and the natural environment where he finds the resources to satisfy his needs.

3. The organizational system consisting of patterns of behavior and arrangements among people and artifacts. In general, any system of technology is enclosed in an organizational system which directs and manages the technology.

4. The society's patterns of beliefs, values, and assumptions, which I shall call, in general, its "outlook." This is of the greatest importance because any people, as a consequence of its historical traditions, have an outlook which takes

the human *needs* common to all mankind and turns them into the human *desires* which are the objects sought by any particular society at any particular time in its history. Thus, all men need food, but Chinese want rice; Europeans may want bread; Americans desire steaks; Eskimos want raw sealmeat or whale blubber; and North Africans may want fried grasshoppers.

On the whole, we might regard these four systems as forming a chain of mutually dependent links in which the biosphere and natural environment is at one end with the artifactual system imbedded in it and operated by the organizational system in accord with the motivations and drives of our outlook. Thus *Outlook* acts on *Organizations* which handle *Technology* against the *Natural Environment*.

On the whole, there is increasing recognition today that the basic causes of our ecologic crisis and its historical roots lie in the first of these systems: our *Outlook*.

This means: (1) that both the causes and the remedies of our ecologic crisis must be sought in changes in outlook; and (2) that changes in our technology and even in our organizational arrangements are, at best, concerned with symptoms rather than with causes. Moreover, remedies sought in these symptomatic areas will probably be enforceable, or even manageable, only with very great expenditures of resources and energy under conditions of great social and political controversy. On the other hand, changes in outlook will, to a much greater degree, lead to changes in organizational arrangements and in the uses of technical knowledge which will be more spontaneous and relatively self-enforcing.

Really, all we are saying here is that the destroyers of our natural ecosystems are not so much the bulldozers or even the internal combustion engines but rather the way these tools are being used. From this point of view, the historical roots of our ecological crisis must be sought in the history of how our present attitudes toward nature and our fellow men came into existence. This is too large a subject to be handled in one brief article, but fortunately there is no need to tell the whole story or even the major part of it.

All we have to do is to establish the chief steps by which our outlook, in the West European and American tradition, became established in opposition to nature. For it is clear that it is not the "backward" peoples of the globe who are threatening to destroy the ecological basis of human life, but the most advanced groups of our own Western Civilization, especially the Americans (followed, in an imitative way, by the Soviet peoples). The peoples of the Third World are threatening the natural environment chiefly to the degree that they are trying to adopt Western (or, to a lesser degree, Soviet) ways of life, including technology, organizational patterns and outlook.

HUMAN ORIGINS

The process of alienation began with the origins of man, at least four million years ago, when our hominid ancestors began to become dependent for survival on learned behavioral patterns rather than on inherited patterns like other animals.

This development came long before man had tools or material artifacts, but his learned behavior patterns, including cooperative behavior, language beginnings, and lengthening infantilism, were artifacts, made by men and passed on by social inheritance rather than by biological inheritance. In time these learned patterns of action and relationships were supplemented by more elaborate or more obvious artifacts, such as developed language, tools and fire-making. In this way, over several million years, man obtained culture which became a buffer between his living body and the natural environment. In time, man came to believe that this buffer of artifacts, customs and learned relations with other humans was the source of all satisfaction of his human needs, rather than simply the instrument through which nature's satisfactions of his needs reached him. And as culture came to seem the source of satisfaction, nature seemed to become a danger and threat to such satisfactions.

This separation of man from nature by culture did not, however, alienate man from nature for millions of years because man con-

tinued to regard himself as part of nature, as a relatively weak being in a nature which contained innumerable other powers. Accordingly, for a long time, man saw his role in nature as relatively helpless; in a word, his attitude in the primitive period was based on humility, not on pride.

The invention of agriculture, in which man had to protect his crops and domestic animals (that is, his *unnatural* possessions) against natural pests and predators (an obligation symbolized by the establishment of fences and barriers around these economic assets), marked an even more drastic change in man's relationship toward his natural environment. But, once again, the increased tendency toward man's alienation from nature thus begun, about 8000 B.C., was curtailed for thousands of years by the persistence of earlier attitudes and beliefs, especially religious beliefs.

In fact, from the invention of agriculture about 8000 B.C. until the organizational and technological revolutions about A.D. 1780, changes and persistence in religious beliefs remained the key factor in this whole subject. To use old-fashioned religious words, man became capable of destroying his natural environment only when his personal attitude toward his environment shifted from humility to pride.

THE ARCHAIC PERIOD

Our present attitude toward agriculture as an activity in which we *force* nature to do what we want by attacking it with tools and chemicals is totally different from man's attitude toward agriculture in the Neolithic period (after 8000 B.C.) and in the Archaic period (say, in the earliest civilizations, from 4500 to 500 B.C.). In the Neolithic period, men generally worshipped the Earth as a Mother Goddess, one among many deities, who provided food, children, prosperity and personal security under the influence of petitions and magical actions, not by any power which could be applied by such a weakling as man.

In the Archaic stage, during which men constructed the first civilizations, men con-

tinued to regard agriculture as a magical and religious activity, rather than as a technological problem. Until the sixth century revolutions, men continued to see all human experience as occurring in a chaos of conflicting powers, not as a system of laws or rules. This chaos was viewed as a single macrosystem in which man, nature, spirits and gods were all mingled in a tangled nexus of conflicting powers.

THE SIXTH CENTURY REVOLUTION

In the thousand years from about 1500 B.C. down to about 500 B.C., this attitude was changed in some areas by a series of intellectual revolutions which we generally know as the "sixth century revolution," from their culmination in the period 600-500 B.C. These changes took place in China, India, and Persia, but we must restrict our consideration to the changes among the Hebrews and the Greeks.

Among the Hebrews during the thousand years after 1400 B.C., new ideas developed about the nature of deity. These ideas were confused, but we may divide them into two stages which we might call: (1) "Providential Monotheism" in the earlier period (say before 600 B.C.); and (2) "Transcendental Ethical Monotheism" (largely after 600 B.C.).

In the earlier stages of this revolutionary growth in men's ideas about the nature of deity, the Hebrews, perhaps inspired by the Egyptians, came to combine all, or almost all, the spiritual powers into a single Supreme Being who was not only the Creator of everything (out of nothing), but was omniscient and omnipotent. There was still, at this stage, no conception of laws or rules; accordingly, everything that happened was the consequence of God's actions. Providential Monotheism was, like the earlier theories of archaic deities, inextricably mixed up with the world of time and nature. Man, in his weakness, was totally dependent on another power and on nature as the variable instrument of that power. But the Hebrew idea of the Providential Creator considered man as the result of a special act of creation in which God had set man *outside* nature and had

given him power over living things (including the right to name them, an ancient symbol of power), and had ordered man to master nature and its creatures for his own use. Thus the orthodox Hebrew, by 600 B.C., could see man as outside nature and even opposed to nature, but was not likely to feel that he could do anything he wished to nature so long as a Providential God was running nature. Indeed, the danger of this was reduced by the growing Hebrew idea that the greatest human sin was pride.

This alienation of man from nature, in Hebrew thought, was symbolized by the story of man's ejection from the Garden of Eden, where he lived with God, into nature, where he had to struggle to earn his bread against the resistance of nature. This belief is an essential element in the causes of our ecological crisis today.

It was not enough, however, for man to feel alien from nature, and for him to come to regard nature as wilderness or "wild-ness," that is, potentially unfriendly and injurious. No major step toward environmental despoilation could be taken, no matter how alienated from nature man might feel, until man ceased to feel weak and began to regard himself as the master of nature. And, in 600 B.C., even the Hebrews could not feel that they were masters of nature until God got out of nature. This occurred after 600 B.C., when the Hebrew God ceased to be actually providential (while remaining potentially providential) and, instead, became transcendental.

By 500 B.C., the leading Hebrew religious teachers were becoming Transcendental Ethical Monotheists. This marked a revolution in human outlook far greater than that attributed to Copernicus 2000 years later. By "Transcendental" we mean that God is seen as outside of the world of nature and of space-time. By "Ethical" we mean that "God is Good," that is, God is seen as not merely all powerful and thus able to do anything; he is also imagined as good, with his power restricted by his goodness. This means that there are rules (at least ethical rules) and that God is under those rules.

In this sixth century revolution among the Hebrews, the seed was planted for much of modern science and modern technology, for, if God were outside nature and interfered with nature only rarely, man (who is also outside nature, since he is a spiritual being like God), could become the master of nature by learning its laws.

For a long time, this consequence did not follow, largely because most people continued to act as if God were merely providential and thus failed to grasp the significance of his being transcendental. This significance, in fact, appeared first among the Greeks, who had their own sixth century revolution in which they invented two-valued logic.

TWO-VALUED LOGIC

Until after 600 B.C., the archaic Greeks, like archaic peoples elsewhere, viewed human experience as a dynamic chaos of nature, spirits, men, gods, and mixed creatures such as demigods. This point of view survived, in one version, in the thought of Heraclitus, who wrote, "All is flux." But even Heraclitus was falling under the growing influence of two-valued logic and tried to analyse the chaos of human experience into the conflict of opposites.

By 350 B.C., this way of looking at human experience in terms of opposites had developed into the explicit logic of Aristotle, in which all things could be classified into categories by the rule of contradiction ("a thing cannot both *be* and *not-be* a quality in the same way at the same time"). Thus to the Greeks, unlike the archaic peoples, things were *either* "living" or "non-living"; *either* "divine" or "not divine"; *either* "in nature" or "not-in-nature."

Under this Greek influence, even those who knew nothing of Aristotle or of logic came to talk of human experience in two-valued terms. In fact, these less sophisticated persons slightly changed the situation by regarding experience in terms of polarized opposites: that is, not simply as "cold" and "not-cold," but as "cold" or "hot," as either "alive" or "dead," and ultimately as "life" versus "death," "material" versus "spiritual,"

"body" versus "soul," and, finally, as "man" versus "nature." Although human experience is not, in fact, experienced in such polarized opposites, this way of looking at human experience and of talking about it did become widely established wherever Greek cultural (or the similar Persian cultural) influence spread. Thus even today, in our society, where Greek culture, including two-valued logic, is explicitly ignored, we still have great difficulty in experiencing life and talking about our experiences except within this unconscious two-valued logical framework.

We are today, either imprisoned in this mistaken way of looking at the world or we are increasingly impelled to flee from rational thought to simple existential social and emotional experiences without rational thinking to escape the straitjacket which misapplied two-valued logic has put on our patterns of rational thought. This explains why we, having ceased to be spiritual and otherworldly in the nineteenth century, have come to regard a totally materialistic and this-worldly way of life as the only alternative. Indeed, for the past 1900 years most Western Christians, even illiterates, have had a tendency to look at the Christian faith through the eyes of Greek logic, because the Western cognitive system was based on two-valued logic. They did this even when most Christians *acted* like non-Christians or heathens in their emphasis, in action, on the heresies of secularism, materialism and this-worldly aspirations.

CHRISTIAN RELIGION VS. GREEK DUALISM

This complicated confusion in the Western outlook lies at the foundation of our present ecologic crisis. In effect, from about 100 A.D. on, there was an irreconcilable conflict between Christian religion and Greek dualistic philosophy. The former generally tried to settle religious questions by a solution which said, "Both," to insure consideration for both sides of human nature, the physical and the spiritual. But the dominant philosophy remained generally dualistic and Greek, while the dominant activities remained secularist and even pagan.

Only briefly, in the period 1150–1300, did Western culture develop a philosophy which was reconcilable with Christian revelation. In this medieval scholastic synthesis, everything from worm to God was seen in one continuous hierarchical pluralistic pyramid, in which nothing was evil in itself, but everything was good in varying degrees, from no-good-at-all at the bottom to the supreme and perfect goodness of God at the top. In this synthesis, evil ceased to be a positive entity and became simply a negative condition, the relative absence of good.

This brief revolution in thought in the High Middle Ages almost reversed the sixth century revolution by making the human body and nature "good" (even if of lesser good than soul or God), because both were made by a supremely good God; this had a tendency to make God appear less transcendental and more immanent, as he had been before 600 B.C. This philosophy emphasized man's role as a part of nature, sustained by the lesser creatures beneath him, who were essential for his survival although not so important as he in cosmic terms; it also emphasized man's individual freedom and personal responsibility toward all bodies, all nature and all creatures. Thus, Francis of Assisi, the "patron saint of ecologists," called the wolf "Brother Wolf," saw God's presence in all nature, preached to the birds, and escaped being attacked as a heretic only by his early death.*

A subsequent triumph of conservative theology was achieved, along with the reemergence of the worship of Greek culture (including two-valued logic) in the period 1400–1600. This gave rise to religious, philosophic and ideological conflicts in which the hierarchical moderates were very largely crushed by the upholders of dualistic spiritual values on the right and the supporters of secular, materialist practices on the left.

These two extremes agreed in their basic dualism. Both saw God as outside the uni-

verse; saw man as outside and opposed to nature; agreed that nature was to be exploited, or even plundered, by man; and found no difficulty in simultaneous usage of spiritual verbiage and material brigandage.

SECULARIZATION OF FUTURE PREFERENCE

With this tacit intellectual agreement, after 1500, the West set out to plunder the world with the sword in one hand and the Cross in the other. Those who remained in Europe continued to provide the material equipment and the intellectual justification for those who sailed the seven seas to China, the Indies, the Levant, Africa and the Americas. One of the intellectual contributions of the seventeenth century was "the secularization of future preference," an intellectual trait which is prepared to make almost any sacrifice of leisure, pleasure or consumption in the present time for the sake of some hypothetical benefit in the future. Such secular future preference became one of the chief bases of the world we have today, since the whole capitalistic economy was built on present sacrifice for future investment. And a large part of our inability to communicate across class lines or across the "generation gap" arises from different assumptions of time preferences: the middle classes assume future preference; their dissenting children reject this for greater emphasis on present preference; the lower classes generally agree with the children; while the few aristocrats in any society have assumptions of past preference. In the present context, the contemporary shift in our society as a whole toward living in the present with relatively little concern for the future is an additional obstacle to any successful handling of environmental pollution or of its most threatening aspect, the population explosion (since birth control is an extreme practice of future preference).

The Enlightenment of the eighteenth century, in some ways, marked a brief halt in the intellectual movement toward assumptions which encouraged environmental pollution, since it unconsciously reverted to some of the beliefs of the high medieval synthesis.

* I owe this idea on St. Francis (along with much else) to my old friend, Lynn White, "The Historical Roots of Our Ecologic Crisis," *Science*, vol. 155 (March 10, 1967), 1203–1207; reprinted in G. De Bell, ed., *Environmental Handbook* (New York: Ballantine, 1970), pp. 12–26.

It believed that man and nature were intrinsically good, that many human cultural conventions were evil and destructive and could be changed by the use of human reason, and that man was part of nature. But, as the Enlightenment became increasingly materialistic and anti-religious, the benefits to the environment which might have arisen from its reversion to some medieval beliefs were lost.

THE RISE OF CAPITALISM

At this point, about 1780, European outlooks had reached a point where man's intellectual readiness to devastate nature without mercy was fully developed, but his ability to carry out such devastation was still severely limited. Limitations on his powers to act destructively were almost entirely removed in the two centuries after the enlightenment. Much of this destructiveness has been attributed to the advent of something called "capitalism," but this economic system had been lurking around Europe and the world a long time before 1780 without contributing substantially to environmental destruction.

From this point on, we must be very careful about our use of terms, because only a most careful definition of the various aspects of the historical process will enable us to identify those aspects responsible for our ecological crisis.

There is nothing new about capitalism today, except that more people live under this system than ever before. If we define capitalism as "an economic system motivated by the pursuit of profits within a price structure," historians will tell us that such a system is older than the Phoenicians and began to grow in our Western civilization as far back as the twelfth century. But it was only about 1780 that any substantial portion of the people of West Europe began to live under a capitalistic system. Until that time, even those persons who lived in the capitalistic economy continued to live in an earlier form of enterprise. But this I mean that their capitalistic economic activities did not take place in a "firm," but continued to take place in a village, a plantation, or in a craft shop.

This invention of the "firm" as the unit of capitalistic enterprise, followed by the invention of the modern "corporation" as a special kind of "firm," have been ignored in most history books, although both these innovations were as important as the industrial revolution which came along about the same time. The "firm" was an innovation in bookkeeping techniques, just as the "corporation" was a legal gimmick. Both were man-made and both are imaginary; yet together with the industrial revolution they have made it possible, even likely, that we have already passed the point of no return in environmental pollution.

THE "FIRM"

Establishment of the "firm" was a book-keeping decision that in calculating profits by subtracting "costs" from "income," "economic costs" would be included but "social costs" would not be counted. Social costs referred to the inevitable cost of human life, the costs of having children, of socializing them and bringing them up, the costs of getting rid of wastes, both sanitary and rubbish, the costs of sickness, incapacity to work, death and burial, the costs of moving goods and people, and the costs of all the non-material aspects of life, including religion, sex, recreation and emotional upset.

All these factors, or most of them, were regularly included in the costs of economic production and consumption in the earlier forms of enterprise we have mentioned: village, plantation or craft shop. These factors continued to exist to a large extent, under capitalism; but they were not included in the cost calculations of the new "firm." When a child fell sick in the village, on the plantation, or in the craft shop, the enterprise did all it could to help. The same thing was true if a man was unable to work: his associates kept the enterprise going. In the craft shop, where this was more difficult, the workers in the shop, including relatives, apprentices, or employees (who lived in), were assisted by the guild, to which many shops were aligned. Orphans, widows, cripples and those too old to work were cared for by their continued

association with the shop and the guild. But in the firm the association was only between an atomized individual and the firm and was continued on a day-to-day basis, so that it ceased the day the individual did not come to work, whatever the cause.

What this meant in practice was that the inevitable social costs were taken off the books of the firm and were imposed on any available social unit. Naturally, the firm showed a "profit." And two other consequences were equally natural: the older forms of enterprise slowly passed from the scene because they could not compete with the firm when the cards were "stacked" in this way. And many social costs, even when they involved the most basic of human needs, were not met. The village would not have left human excrement piled up on its paths, but Sir Edwin Chadwick's reports to Parliament on the slums of London in the 1830's tell of tenement courtyards housing hundreds of persons in which human excrement was eight inches deep, simply because no social group assumed the responsibility for removing it, or even knew what to do with it.

THE INDUSTRIAL REVOLUTION

The destruction of social grouping and of personal or social responsibilities arising from the invention of the firm was made worse by the advent of the industrial revolution about the same time.

Here again, we must be careful about definitions. The industrial revolution has been confused with many developments including the rise of capitalism and the factory system. Correctly, it should refer to the application of energy from non-living sources to the productive process. That means energy which does not come from the actions of men or animals, but rather from such things as falling water or fossil fuels. The latter, originally delivered through the external combustion (or steam) engine, now comes largely from internal combustion engines. In any case, the key to the industrial revolution lies in the fact that it made it possible for men, with relatively unlimited sources of non-living energy (at least temporarily), to enter

upon an era of relatively unlimited quantities of production.

It also gave them the power to devastate and pollute nature to a degree which was also relatively unlimited. The early protests against this were based on aesthetic grounds and the violations of the ordinary amenities of life, rather than on the threats to human health and life; later these dangers were recognized.

But the adverse influence upon life and health of the early industrial revolution was soon counterbalanced by advances in science and technology, especially in medicine and eventually in sanitation, with the result that a fall in death rates much greater and more rapid than a somewhat similar fall in birth rates led to the population explosion. This has now become one of the greatest threats to the natural ecologic balance, especially in the less developed areas of the globe which have received the new techniques for saving lives much sooner than they have accepted either the techniques or outlook for any reduction in birth rates.

The combination of the capitalistic firm and the industrial revolution gave us the factory system, something which has received more than its share of blame from historians. But the factory system was only one example of a nineteenth century tendency toward division of labor and specialization, which was itself merely a localized manifestation of a much deeper intellectual attitude which could be called "analytical thinking."

"Analytical thinking" assumes that we can find out how anything functions and can, indeed, control its functioning, if we take it apart. This is a very Western way of looking at human experience. This movement toward isolation, analysis, quantification, division of labor, specialization and materialism gave Europe and the United States a point of view, by 1880, which we may call "positivism." In economic theory it assumes that if we take care of the parts, the whole will take care of itself.

The damage which the positivist outlook of the 1880's inflicted on economics also affected education. Just as the depression of

1930 showed the bankruptcy of accepted economic thought, so the whole educational system today is being forced by the ecologic crisis to turn from its existing specialized, analytical, materialistic, quantitative approach toward a more holistic, contextual and qualitative approach. It is worthy of note that the existing specialized university departments have very little to contribute to the dominant problems of today (such as war and peace, environmental pollution, economic backwardness, mental ill-health, urban violence and crime, ghetto poverty and youthful dissension) just because these problems fall *between* the specialized academic departments. These problems are problems today because they have been so long neglected, and they have been neglected because they did not readily fall within any specialized academic department but bridged over many subjects.

Since the triumph of the positivist outlook about 1880, Western civilization's rush toward the environmental crisis has accelerated. It took thousands of years for men's ideas to reach a point where men were ready to plunder and destroy nature; it required more than a century after 1780 for men to devise a technology able to do this; but it took only a century or less, after 1850, for men to obtain a social organization which compelled them to use that power in destructive ways as an everyday mode of living.

THE TWENTIETH CENTURY CRISIS

In the final stage of this sad story, the American contribution has been paramount. The reasons for this are very complex and are interwoven into the whole history of the United States. First of all, the people who came to America were different from the people who stayed in Europe. Those who came were more alienated, if not from nature at least from their social context. They were psychologically more restless. This combination of social alienation and psychological restlessness gave them greater psychological insecurity, a feeling which Americans have increasingly tried to assuage by the piling up of material possessions, by immersion of self

in ambiguous social groupings, and by symbolic distinctions of differential status (including academic degrees). All of these factors intensified an outlook which made the plundering of nature seem natural.

Moreover, these immigrants came from regions where there was a relative scarcity of the economic factors of production. Generally, the immigrants left places where labor was in over supply and cheap, while land and materials were in under supply and expensive. In such conditions, economic processes tended to be wasteful of labor but saving of land or materials. In America, the situation was the reverse. Labor was scarce and thus expensive, but the continent was plentiful in land and materials. Thus the American economic processes tended to be labor-saving but wasteful of land or materials.

An example of this may be seen in early American agriculture which sought productive efficiency in high output per man-hour of labor, while European agriculture sought productive efficiency in terms of high output per unit area of land. Thus, Americans turned to power production and excessive mechanization of all economic processes, with little concern for any resulting waste of materials or land. The land was plundered of its natural vegetation and its natural fertility leaving, as a heritage, the exhausted lands of the east and the eroded lands of the west.

In less than two centuries, the magnificent virgin forests were gone, along with many of their natural creatures, the natural waters had vanished or were polluted, and the mineral resources were approaching exhaustion. In their place were mountainous accumulations of waste of all kinds, all justified in the name of "labor-saving" techniques, regardless of the destruction of resources, the growing human inconveniences and the decline in efficiency and the real quality of life.

This last point is important for it describes what Americans have done with the corporation and how they can use falsified accounting techniques and mistaken taxation methods, not only to encourage this process, but to conceal from themselves what is really happening.

The corporation is a legal device by which a group of persons can be regarded as a fictitious person in law and can thus own property and sue and be sued in the courts. A corporation allows the savings of many persons to come under the control of a few persons; thus it is a device for capital accumulation. But, unlike real persons, corporations do not die. Their property is not periodically redistributed by natural death, but can continue to grow and be applied to the same ends, even when these ends have become undesirable. Moreover, the corporation has limited liability in law and even more in fact.

Moreover, the corporation, by its accumulation of wealth and power, can cease to be the instrument through which human needs are satisfied and can become an institution to which real persons are increasingly enslaved. Moreover, it can use its power to reformulate the tax laws and thus all the flows of income in the country so that almost limitless moneys can be made available for corporations and for hardware. If any obligations are forced on corporations to direct any small portion of their power and resources to cover social costs, to pay for human welfare, or to provide amenities, both the tax system and the corporation's own system of accounting can be exploited to see that these costs are forced onto the consumers or onto the government (which then can tax consumers).

The ultimate falsehood of our accounting is to be found in official and semiofficial statistics on the American "standard of living." All amenities, all personal enjoyment and leisure, all considerations of quality, of nature, and of satisfying personal social and emotional relationships are rigorously excluded from any statistics of the American "standard of living"; so are all negative factors such as increasing crime and violence, pollution, disorder, noise and neuroses. Instead, the figures on our "standard of living" detail, as they have for years, only quantitative and material values: how many automobiles (but nothing about atmospheric pollution, traffic jams, or the dead and maimed from motor accidents), how many telephones

(but nothing about whether the messages they carry are joyful or sorrowful), how many devices for transmitting or amplifying sound (but nothing on noise pollution), how many bulldozers and earth-movers we have (but nothing on the trees they uproot, the natural drainage areas they disrupt, or the rivers they fill with eroded topsoil).

Moreover, this whole system of false reporting on the condition of America is solidly sustained by the tax system since the upkeep and maintenance of the most destructive earth-mover is tax-deductible.

Leaving aside questions of outlook, the chief tools we must obtain in seeking remedies for our ecologic crisis are these: (1) a tax system and a fiscal policy which direct income-flows in the United States in constructive instead of in destructive directions, by taxing destructive acts and subsidizing constructive actions; (2) a revision of corporation law so that corporations cease to be the masters of our society and become, as they were intended to be, its servants; and (3) standard-of-living statistics (or a system of social accounts) which will give us a more accurate idea of where we are going, and how fast, by giving weight to all the real elements of human living (that is, the non-material, the qualitative, the social, and the ecological).

These three basic areas of reform so necessary for ecological reconstruction are most unlikely to be achieved, even to a modest degree, unless two other areas of misdirected energies and general corruption are also reformed: our political system and our educational system. The political system must become more responsive to the interests of human beings and of real human needs and less responsive to the interests of corporations and to hardware and other material accessories. The educational system must like-

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Carroll Quigley, a contributing editor of *Current History*, is the author of *Tragedy and Hope: A History of the World in our Time* (New York: Macmillan, 1966) and *The World Since 1939: A History* (New York: Collier Books, 1968).

"Resolution of the solid wastes problem will require radical change in patterns of consumption and disposal, major shifts in municipal administration, and a national change in attitude about the environment." This specialist outlines the difficulties involved in disposing of solid wastes, and concludes optimistically that "The prospects for improving the quality of the environment can be bright if we revise our values, adjust priorities, and set realistic goals."

Solid Wastes and Land Pollution

BY FRANK A. BUTRICO

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THE UNITED STATES is embarking on a major effort to reverse environmental deterioration. President Richard Nixon has made this a national goal for the decade of the 1970's, and is being joined by the Congress and by all segments of society in pressing for immediate action.

Over the past decade, great emphasis has been directed at controlling air and water pollution. It was inevitable that attention would be focused next on solid waste disposal. Actually, this facet of environmental pollution has been in the picture all the time because, in many cases, poor disposal methods have created serious air and water pollution problems. The increased attention to pollution has many causes. But it is most significant that more and more people want more and more products that require more and more resources, the production and consumption of which are causing serious degradation of the land environment.

Solid waste problems are growing rapidly because of urbanization and increased industrial production. Many of the materials used and discarded are not easily destructible or biodegradable. The result is scenic blight, serious hazards to public health, accident hazards, adverse effects on land values and, in general, interference with community life and development.

The total amount of all types of solid wastes generated in the United States yearly is 3.5 billion tons. This includes about five pounds of refuse per person per day, or a total of 190 million tons per year. The refuse total will reach eight pounds per person per day by 1980 and, assuming a national population of 235 million, at that time something over 340 million tons of solid wastes will have to be collected every year.

In addition, estimates by the Department of Health, Education, and Welfare indicate that seven pounds of household, commercial and municipal wastes are generated per person per day, or over 250 million tons per year. To this must be added more than one billion tons of mineral wastes from mines, mills, smelters, refineries and foundries, and two billion tons of agricultural wastes.

Little mentioned but nonetheless significant are atomic wastes buried at various locations, and to complete the picture we can include the "garbage" now in orbit throughout space.

A variety of solid waste disposal practices are in use today, the two most popular methods being sanitary landfill and incineration. Because of the increased volume and the characteristics of today's waste products, it is obvious that these practices must in some cases be replaced or supplemented with more advanced disposal methods. As President

Richard Nixon indicated in his 1970 Message on the Environment to the Congress,*

If we are ever truly to gain control of the problem [solid waste management] our goal must be broadened; to reduce the volume of wastes and the difficulty of their disposal and to encourage their constructive reuse instead.

LANDFILL OPERATIONS

In the United States, the primary method of disposing of refuse is by open dumping. This procedure, which still accounts for 85 per cent of waste disposal systems, is undesirable because of odors, rats, flies, roaches and runoff that pollutes ground surface water and creates air pollution problems when the material is burned. The Department of Health, Education, and Welfare indicated recently that 94 per cent of the 12,000 disposal sites in the United States are unacceptable and threaten disease, pollution and blight.

A refinement of the open dump is the sanitary landfill method which handles about five per cent of the nation's garbage. If properly operated, each day's untreated garbage load is buried under six inches or more of impacted earth in such a way as to prevent ground and water pollution and other nuisance conditions.

Landfills also have their drawbacks because, among other factors, packaging materials of paper and plastics do not readily compact; this shortens the life span of the landfill and reduces its effectiveness. Rapidly biodegradable materials would be a blessing, but current trends in packaging have not progressed in this direction.

On the positive side, the landfill technique has transformed large acreage of low-value land into parks, playgrounds and other recreation facilities. The New York metropolitan area is considering building its fourth major airport on a foundation of garbage fill to be dumped on offshore shallows. Du Page County, Illinois, is building a ski slope on a hill of earth-covered garbage, and Virginia

Beach is building an amphitheatre on solid waste.

Many contend that this type of disposal method cannot be increased significantly because space for landfill will be hard to find and will be increasingly expensive. However, further investigation may reveal much low-value land to be improved, such as abandoned strip mines. Also, much more should be done to educate residents around active landfills and at potential sites to accept the temporary disadvantages in anticipation of the future benefits.

Incineration of wastes is a common practice. Between 8 per cent and 10 per cent of the nation's garbage is disposed of by this method. It, too, has its shortcomings. About 75 per cent of the equipment in current use contributes to the air pollution problem, and the residue of 20 per cent or more must still be disposed of. Incineration requires a large capital investment and, in addition, is considerably more expensive than landfill, usually costing \$7 or more per ton.

More extensive use of incineration will be possible with improved designs. Currently under study is the use of high-temperature incineration—temperatures between 2500° and 3200° F.—which will reduce wastes as much as 95 per cent and will also reduce environmental problems associated with smoking stacks and biological degrading residue products. Atomic Energy Commission physicists are also discussing the "fusion torch" that uses thermonuclear energy to convert all waste compounds back to the original atom. In one experiment, for example, cellulose was broken down to its elemental parts and then recombined to make paper.

An answer to the problem of disposing of some of the seven million cars and trucks currently being abandoned may be a smokeless incinerator now under development, which is expected to process 50 junked cars every eight hours. By burning two cars at a time the incinerator heats the combustion gases to a temperature of more than 1350° F. in an afterburner chamber. In such chambers the carbon particles, which normally constitute smoke, are oxidized and drawn up-

* Ed. note: For excerpts from this message, see *Current History*, June, 1970, pp. 362ff.

ward to the atmosphere without the combustion gases.

The cost of incineration may be reduced materially if means can be found to reclaim the waste heat. A commercial organization is now marketing an incinerator-generator which can dispose of garbage and generate steam—at a cost of between \$5 million and \$50 million a unit, depending on the size of the project. It might be possible, for example, to locate such a unit at a strategic point in a city and use the heat generated to take care of some power needs.

DUMPING AT SEA

As the supply of land for waste disposal diminishes, attention is turning to dumping at sea. Garbage is not discarded by this method because, as was demonstrated in the New York City area, material is washed ashore. However, this same metropolitan area is presently utilizing offshore sites for disposal of sewage treatment plant sludge, industrial wastes, contaminated dredgings and refuse from the construction industry. In 1968, nearly 14 million tons of waste were discharged just 12 miles from shore. Although this dumping has been going on for over 40 years, questions are now being raised about what it is doing to the offshore marine environment—and to the ocean itself. No one knows for sure what long-term damage has been done.

There are studies under way on special kinds of disposal that might benefit the ecology of the ocean. For example, old tires discarded in the sea off the New England coast have proved useful sites for fish breeding, and experimental work is in progress in the Delaware Bay to determine whether waste clam shells can be used as a spawning bed for oysters.

Investigators at Harvard University are studying the combination of incineration and dumping at sea. They are working on designs for an "incinerator ship" which would burn wastes at sea and discard the residue on site.

For several years now, some of the major metropolitan areas have been considering the

use of railroads to ship refuse to rural locations. Under most proposals, garbage and trash would be collected and processed into bales at a central transfer station in an urban area and would then be moved by rail to a landfill far from the city.

There are also disadvantages to this method. First, it is only a short-term solution, in that it does not cut down on the mass of refuse and the amount of land being devoted to its disposal. Second, people in the receiving area do not take kindly to disposing of someone else's garbage. Third, it may prove to be uneconomical. The prices now being quoted are about \$7 per ton for rail haul and, while cities like New York may find this within their means, many smaller jurisdictions will consider this cost prohibitive.

Since the collection and transportation of wastes usually consume up to 75 per cent—85 per cent of the total disposal expenditures, chiefly due to labor costs, better management techniques must be developed.

The transfer of wastes from points of storage to vehicles and transport to the processing or disposal sites now cost about \$4 billion per year. Ways must be found to eliminate the use of costly compactor trucks for hauling as well as compacting. It would be cheaper and more efficient if compacted garbage were brought to compactor trucks by smaller, more economically operated vehicles.

There could also be great savings in collection if some mechanism existed whereby multi-political jurisdictions could pool their resources. Jointly-shared transfer stations, landfill sites and other economies of scale could reduce considerably the costs to each municipality.

Experimentation is going on to develop a plastic bag substitute for garbage cans since, in limited studies, it has been demonstrated that handling bagged garbage is 26 per cent faster than handling cans.

There would be a considerable saving if the volume of wastes to be collected were reduced. This could be accomplished by using on-site or mobile incinerators and by using systems for grinding up all wastes, mixing them with water, and piping them to another

location as a slurry. The latter might eliminate at least one waste collection per week, thus reducing costs by about 35 per cent.

Pneumatic-tube waste-disposing systems have been tried in Europe and the Walt Disney organization is planning such equipment for its new Florida development.

Other possibilities being worked on for volume reduction include large machines that chew up a car so that it is reduced to a fist-size metal chunk, developing particularly potent strains of trash-eating bacteria, finding replacements for the disposable bottle, and producing biodegradable plastics.

REUSE AND RECYCLING

A significant impact will not be made in controlling solid wastes problems until means are found to reuse and recycle a far greater proportion of waste materials. A scientific report prepared for the Senate Public Works Committee in 1965 said:

It is now evident that the industrial economy of the United States must undergo a shift from a use-and-discard approach to a closed cycle of use and salvage, reprocess and reuse . . . or else face the alternative of a congested planet that has turned into a polluted trash heap, devoid of plant and animal life, depleted of minerals, with a climate intolerable to man.

Recycling of materials is increasingly important, not only for waste disposal but also to conserve limited resources. The problem of incineration residues is not insurmountable if reuse and recycling are taken seriously. For example, up to 75 per cent of incinerated refuse is glass and metal, and it is believed that nearly 15 million tons of the nation's annual trash pile may be composed of waste glass. There are proposals to recover and purify glass powder from urban incineration for use as aggregate to replace the sand in aerated concrete.

Also, these residues may contain recoverable valuable metals in seriously short supply. We are now importing 85 per cent of our aluminum ore (bauxite) and 40 per cent of our iron ore—both ingredients of incinerator residues. The Bureau of Mines has reported that, for each ton of refuse incinerated, about

20 per cent of fly ash is generated and this contains gold and silver. Values in the fly ash from incinerators have been found to be comparable to the assay of gold and silver in a normal mine out West.

Composting—processing garbage for use as a soil conditioner—has failed in the United States because the producer has been unable to dispose of the end product, the operating costs have been underestimated, and much of the refuse received at the plant site is non-compostable and has to be disposed of by other means.

One possible way to overcome some of the problems would be to integrate composting with the sewage treatment process. Much of the refuse presently non-compostable would be rendered useful by the addition of nutrients from sewage sludge. But economically, the final product of composting cannot compete with chemical fertilizers because it does not have the nutrients.

The electric utility industry must ultimately dispose of mountains of ash residue that accumulate at coal-burning power stations. There are several uses that can be made of the fly ash, principally in concrete for dams, highways and other major construction. In this application, fly ash acts as a pozzolan—a material that by itself has no cement properties but, when added to cement mixtures, enhances the properties of the final concrete mix through a chemical reaction with cement ingredients. Fly ash also has a number of other applications as a construction material. It can be used as a mineral asphalt filler in paving and as a soil stabilizer for soil bankments, and in hydrated-lime fly-ash compounds as a base course for road beds. Of all the future uses for fly ash, perhaps none has the potential or generates as much enthusiasm as its possible utilization in the manufacture of face brick for residential and commercial construction. A process for the manufacture of fly-ash brick was developed a little over two years ago by a group at West Virginia University.

There is also some investigation going on into the possibility of converting fly ash into high-quality mineral wool insulation fibers

which thus far have displayed superior corrosion-retarding properties when used in contact with iron-bearing materials such as pipe.

Taconite tailings wastes from iron ore production in northern Minnesota are now being produced at the rate of 60 million tons a year, and will reach an aggregate of more than 30 billion tons before the ranges are played out. Some researchers are suggesting the possibility of foaming the tailings for use in building materials. Lead, zinc and copper ore tailings are also being studied for possible building use.

About two-thirds of the solid material in the average city dump, according to one study, consists of various forms of cellulose—about three pounds per person per day. In nature, cellulose produced by plants is broken down by bacteria and thus reenters the food cycle. Work at General Electric Research and Development Center is going on to develop selected strains of bacteria to see whether the same kind of process can be used under human control to convert garbage into protein-rich animal foodstuffs.

Aluminum scrap is appropriate for recycling because of its high value and indestructibility. About one-third of the aluminum in the world is already being recycled. One major aluminum company in the United States has initiated a major recycling program.

It is also important to consider recycling some of the 50 million net tons of paper and paper products that end up as wastes. The National Academy of Engineering Report of 1969 on "Policies for Solid Waste Management" indicated that the production of paper and paper products would amount to 100 million net tons by 1985. If only 25 million tons could be reclaimed from solid wastes they would release 91.5 million acres of forest land for other beneficial uses.

Currently there are over 100 million automobiles in use in the United States, but for every ten cars in use there are about four junked, wrecked or abandoned on city streets, vacant lots and in open country. The exact number has never been accurately counted but could range as high as 40 million. The answer to this problem lies in recycling.

About 90 per cent of the cars abandoned or junked each year find their way back into the steel furnace. The reason the other 10 per cent do not is economic. The recycling of automobile bodies, like the recycling of any waste material, is an economically marginal business. The scrap made from an automobile has to compete with other sources of scrap and with iron ore. As long as the steel industry can obtain non-automotive scrap and iron ore at attractive prices, its requirements for junked automobiles will remain at a level that will keep prices down.

At least two steps can be taken to help alleviate this problem. On the production side, the manufacturers should consider modifying the materials used and construction procedures so that usable and more valuable components can be separated for reuse. On the raw materials side, the steel industry might consider incorporating process changes that could accommodate greater quantities of automotive scrap so that the price of this material would become a much more attractive resource.

THE PACKAGING PROBLEM

The magnitude of the packaging problem has resulted in specific legislation being introduced on this subject by Senator Gaylord Nelson (D.) of Wisconsin. The total amount of packaging consumption in the United States was 103,400,000,000 pounds in 1969 and is expected to increase to 147,000,000,000 pounds a year by 1976. With only 10 per cent of the present day volume recycled back into the economy, these discarded packaging wastes are a drain upon the natural and

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Frank A. Butrico was chief of the Public Health Service's Office of Resources Development, concerned with various aspects of environmental health. In 1960 and 1961, he served as executive secretary of the first national conference on water pollution. He is the author of more than 40 papers on the health aspects of nuclear energy, on water pollution control research and on manpower needs in sanitation and environmental health.

"The story of air pollution control in this country is the story of evolving concern. First, there were a few tentative steps when, as short a time ago as 1955, Congress passed the first really meaningful air pollution control legislation. . . . By 1963, however, it became clear in Washington that state and local governments were not doing the job. . . ."

Air Pollution

BY DAVID R. NEWMAN

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THERE IS NOTHING NEW, of course, about air pollution. It has been with us in small ways since the first man built a fire that sent thin wisps of smoke into the ancient sky. Even earlier, prehistoric volcanoes dumped lava and dust into the waiting air.

The difference today is that people worry about air pollution. And they worry with good reason, as an ever-increasing population pours an ever-growing number of substances into the fragile envelope of atmosphere that surrounds the planet to support life.

The part of the earth's atmosphere available to dilute air pollution "is confined to a bottom layer about six miles thick," says the National Academy of Sciences. This layer contains some 70 per cent of the total air mass, and includes the "complex wind systems and other factors that establish ventilation rates and patterns."

Since a human breathes about 300 cubic feet of air daily and there are about 60 billion cubic feet available to him, the supply of air seems almost infinite. But population densities and meteorological conditions cut down this available supply. For example, says the Academy, "with an inversion height of one thousand feet the average daily supply in Los Angeles is only a few million cubic feet per person."

To discuss air pollution in any perspective is to talk about the major substances man

pours into the atmosphere. Whether they affect human health is still a matter of scientific question, although the question grows smaller as the science expands.

The major pollutants today are carbon monoxide, oxides of sulfur, hydrocarbons, particulate matter, oxides of nitrogen, and other gases. But the problem is not so simple, because the pollutants can combine and can form new pollutants. Thus, as a congressional committee has reported, "the complete composition of the urban atmosphere is largely unknown."

There is enough evidence that certain amounts of pollutants in the air can harm human health, and the growing pollution levels worry scientists. For example, the largest urban air pollutant is carbon monoxide, which stays in the atmosphere from one month to five years. The Department of Health, Education and Welfare says that in 1968 some 102 million tons of carbon monoxide were emitted in the United States—half of all major air pollutants that year.

In a recent report, H.E.W. says that more than half the carbon monoxide came from the automobile; 11 per cent from industrial process sources, 8 per cent from burning trash, and 17 per cent from other combustion sources—mainly forest fires.

What are the effects of carbon monoxide on health? H.E.W.'s study—which is really a synopsis of most major studies on carbon

monoxide throughout the world—says that an exposure of eight or more hours at 10 to 15 parts of carbon monoxide per million cubic feet of air “will produce a blood carboxyhemoglobin level of 2.0 to 2.5 per cent in non-smokers.” And this level “has been associated with adverse health effects as manifested by impaired time interval discrimination.” There is further evidence that exposures for eight hours at 30 parts per million will produce five per cent levels of carboxyhemoglobin. And this level produces impairment of other functions. Above five per cent: “there is evidence of physiologic stress in patients with heart disease.”

The figures may sound mundane until it is realized that the levels of carbon monoxide on a busy city highway do reach levels where a driver’s ability to react quickly can be impaired.

The major air pollution control effort to date has been aimed at the internal combustion engines that drive the 100 million cars on the nation’s highways and are the sources of most carbon monoxide.

The federal government first began regulating automotive pollution in 1968, taking a cue from California, where controls have been in effect since the state discovered that the automobile was a big cause of the eye-smarting smog.

THE AUTO INDUSTRY

The automobile industry was slow to come around to the idea that pollution from cars should be controlled. In 1953, the Ford Motor Company wrote to a Los Angeles county supervisor to say that

the Ford engineering staff, although mindful that automobile engines produce exhaust gases, feels these waste vapors are dissipated in the atmosphere quickly and do not present an air-pollution problem. Therefore, our research department has not conducted any experimental work aimed at totally eliminating these gases.

Today, the industry has made a complete turn-around in the face of increasingly strin-

gent federally imposed controls and public outcries. In fact, whereas several years ago Detroit was pleading for more time to develop control devices, the industry now says it can meet standards proposed for 1975 that cut air pollution from cars to fractions of their present amounts.

To meet the more stringent standards, the auto makers must install new devices on cars. And for these to operate properly, many feel that lead will have to be removed as an additive to gasoline because of the fact that lead quickly corrodes the catalytic converters, which are devices the auto makers want to use to meet the 1975 standards.

The automobile makers’ moves to remove the lead from gasoline—a move helped by some oil companies—was praised early this year by President Richard Nixon in his environment message.* Said the President:

... the nation’s principal automobile manufacturers are not only developing devices now to meet present and future federal emission standards, but are also, on their own initiative, preparing to put on the market by 1972 automobiles which will not require and, indeed, must not use leaded gasoline. Such cars will not only discharge no lead into the atmosphere, but will also be equipped with still more effective devices for controlling emissions—devices made possible by the use of lead-free gasoline.

Today the lead level around the world is indeed rising, but there is still no hard evidence that its presence in the atmosphere has a direct effect on human health. Removal of lead, in fact, presents a perfect example of the problems of pollution control. If it is indeed removed, it must be replaced by other additives, so that the octane rating of gasolines (lowered by the removal of lead) can be raised enough to drive the high-horse-powered engines produced in Detroit. But the big problem for pollution control is that there is less known about the health effects of other additives than is known about lead. In fact, some of the potential replacements for lead are known to be possible factors in causing cancer.

There are other industries producing pollutants that are considered dangerous to health. At hearings on Capitol Hill several years ago,

* Ed. note: For excerpts from this message, see *Current History*, June, 1970, pp. 362ff.

an official of the Department of Health, Education and Welfare listed industries that should be considered candidates for strict controls over emissions. They included: "nitric acid plants, which produce odorous materials, soap and detergent plants, caustic and chlorine plants, and calcium carbide plants." The official went on to add "cement plants; sulfuric acid plants which produce sulfuric acid mist as well as sulfuric acid; gray iron foundries, from which we have smoke, solids and odors; pulp mills, in which we are concerned with particulate wastes, sulfates and malodorous materials."

Public alarm over air pollution generally dates back to 1930. In that year, in early December, a thick fog settled over the Meuse Valley in Belgium. There were six thousand reported illnesses during a one-week period; several hundred people had severe respiratory symptoms; and 63 citizens died who probably would have lived had it not been for the fog. Why did the fog cause so much trouble? Chemical analyses showed that the air at that time contained 30 pollutants, with maximum concentrations of carbon monoxide, carbon dioxide, nitrous gases, sulfur dioxide and hydrogen fluoride.

In this country, the first real alarm bell rang in October, 1948, when a heavy smog settled over the small town of Donora, Pennsylvania. A good many in the town of 13,000 became ill and 20 extra deaths resulted. A study the next year showed that the cause of the episode was an accumulation of chemical irritants in the atmosphere.

Probably the biggest modern air pollution warning, though, came in 1952, when 4,000 more deaths than usual were reported in London as a result of the great London fog. Many of those who died were well when the episode began, and the implications were that the sky laden with pollutants spurred their deaths. There were other major London episodes in 1957, 1958 and 1962.

Characteristic of most air pollution episodes—and this holds true in Los Angeles, where until recently the eye-smarting smog was an ever-increasing problem—is a heavy smog that does not go away. The problem

is a temperature inversion, where the air literally becomes stagnant and is not dissipated. In such episodes, the pollutants that poured from the many industries and home fires went into the neighboring air, and continued to become more concentrated and stayed until the wind started to blow and fresh air brought the pollution levels down to more liveable levels.

The fact that there were many sources of smoke in the heavily industrialized areas was in itself not the real problem. The big problem was the contents of that smoke. In most cases, the culprit is the high sulfur content of the fuel that is burned. Sulfur today is generally regarded as the most widespread pollutant from non-automotive sources that causes the most harm to human health and welfare. One reason it is so prevalent is that a good part of the coal burned throughout the United States and West Europe has a high sulfur content. Besides sulfur, there can be large amounts of small solid matter—particulates—that also go into the air.

AIR POLLUTION CONTROLS

The story of air pollution control in this country is the story of evolving concern. First, there were a few tentative steps when, as short a time ago as 1955, Congress passed the first really meaningful air pollution control legislation. It established a policy that the fundamental responsibility of dealing with community air pollution problems lies with state and local governments, with the federal government having an obligation to provide leadership and support.

The Department of Health, Education and Welfare thinks this was a good beginning:

Between 1955 and 1963, great strides were made toward improved scientific knowledge of the nature and national extent of the air pollution problem, its impact on public health and welfare, the existence of techniques for controlling many important sources of air pollution, and the need for new and better techniques in many cases.

By 1963, however, it became clear in Washington that state and local governments were not doing the job, possibly because they were ill equipped to act because of inadequate

funds and few trained scientists. So in that year, Congress passed another law that allowed the federal government to take two main roles—awarding of grants to state and local agencies to help them develop, set up, or improve control programs, and federal action to abate interstate air pollution problems. That bill also expanded the research and development legislation of the federal government and called attention to two areas of air pollution—motor vehicle pollution and sulfur oxides pollution coming from the burning of coal and fuel oil.

H.E.W., which oversees the nation's air pollution program, feels that this bill triggered four years of "unprecedented expansion of state and local programs," and that the research paid off in seeing the development of new control techniques to control pollutants.

But by 1967, there were strong doubts about the effectiveness of the regional approach. Thus President Lyndon Johnson proposed what was really the first national attack on air pollution. He called for national standards to control the emissions from certain industries (unspecified).

As the then Secretary of H.E.W., John Gardner, put it so eloquently:

Surely, in a nation that has scaled the peaks of technological achievement, where most people enjoy unprecedented standards of personal prosperity, it is not asking too much to insist on the right to breathe decent air. Yet for most Americans, getting a breath of fresh air is becoming more and more difficult.

LEGISLATION ON NATIONAL STANDARDS

But it was just as difficult to enact legislation that would have controlled pollution industry by industry. What emerged from Capitol Hill after prolonged hearings and after heavy pressure from industry was a complicated law that involved the federal government but put a heavy burden on the states. The law was written to insure that no industry would be put out of business because of requirements to abate pollution beyond technologically available levels.

Instead of controlling pollution on an in-

dustry-by-industry basis, Congress passed a complicated law that calls for control of air pollution on a pollutant-by-pollutant basis.

In brief, H.E.W. designates air quality control regions; develops and publishes air quality criteria based on scientific evidence of air pollution effects; and publishes information on available control techniques. The states hold hearings and set air quality standards, based on the criteria, within air quality control regions. H.E.W. reviews the state standards; then the state establishes an implementation plan for meeting the standards.

States with good pollution control programs of their own—like New York and California—were expected to have less difficulty than states with little expertise in the pollution control area.

By early 1970, H.E.W. had issued criteria only for sulfur oxides and particulates, carbon monoxide, photochemical oxidants and hydrocarbons. Only 29 air regions were selected out of an initial list of 57 that will take in the most polluted areas of the country; initial standards were approved in only two regions—the Philadelphia metropolitan region and Chicago.

Also early in 1970, the Nixon administration decided it needed its own mark on the pollution control program and sent a large package of legislation to Capitol Hill—following the President's environmental message in February.

The administration's feeling was that the program was not going along fast enough and was too complicated. So the President proposed scrapping the long process of asking the states to set standards from federal criteria. Instead, the President called for national ambient air standards, with the federal government instead of the states setting the standard. Whether this approach will work is still to be tested. Under the administration proposal, the states would still be responsible for implementing the standards, which means they would still have to set emission standards for the pollutants that H.E.W. thinks may be harmful to human health. Said the President in his environmental message:

Existing technology for the control of air pollution is less advanced than that for controlling water pollution, but there is a great deal we can do within the limits of existing technology—and more we can do to spur technological advance.

He went on to call the 1967 Act that set up the criteria and standards procedure the "first major federal effort to control air pollution." It was, he said, a useful beginning. But, he explained, it had shortcomings:

Federal designation of air quality control regions, while necessary in areas where emissions from one state are polluting the air in another, has been a time-consuming process. Adjoining states within the same region often have proposed inconsistent air quality standards, causing further delays for compromise and revision. There are no provisions for controlling pollution outside of established air quality control regions. This means that even with the designation of hundreds of such regions, some areas of the country with serious air pollution problems would remain outside of the program.

It is time, he went on, to "build on what we have learned, and to begin a more ambitious national effort."

There is no longer any question that air pollution will be controlled. The public outcry against dirty air and smarting eyes may be a momentary fad, but the fad has made the public so aware of its environment that continued pollution of the atmosphere without public reaction is unimaginable.

The big problem for the future, though, is what will be controlled, how extensive the controls must be, and what real scientific evidence is being developed to show that some pollutants are indeed harmful to health. Or should pollution be controlled just because it exists—regardless of its effects?

Perhaps the most succinct comment on controlling air pollution was made by Dr. John T. Middleton, Commissioner of the Department of Health, Education and Welfare's National Air Pollution Control Administration. When asked at a Senate hearing several years ago if there were sufficient evidence to develop standards and control pollution, Dr. Middleton answered: "We don't know all we need to know about the effects of air pollution, but we know enough to say that something must be done."

And many conservationists would go a step further to say that any pollution is bad and nothing should be allowed to go unchecked into the atmosphere—no matter what the cost.

Middleton neatly summarized the need to control pollution when he testified before the Senate Public Works Air and Water Pollution Subcommittee in 1967:

To begin with, the fundamental purpose of controlling air pollution is, of course, to protect public health and welfare. As a practical matter, this means that the quality of the air in most American communities must be greatly improved. Scientific knowledge of the degree of improvement needed to prevent injury to health is steadily increasing. And the more we learn, the more it seems that our ultimate goal may be to reduce contamination of the air resource to levels approaching those which generally prevailed before the industrial revolution. What we are learning is, perhaps, that man cannot adapt, without basic biological and physical changes, to an environment which is far different from and, in many respects, more hostile than, that which existed during most of the long period in which human evolution has taken place. I am not suggesting that the human species is in imminent danger. What I am suggesting is that we must move quickly toward objectives that can realistically be reached through full application of our existing technical capability for controlling air pollution, while we keep clearly in mind the ultimate need for a much more sophisticated and comprehensive attack on the problem.

Realistically, however, abatement of air pollution will have to be based both on the technological feasibility to abate and on the need to abate based on effects on human health and welfare. Otherwise, industries will be shut down and the country will face a situation like the one being faced in the summer of 1970 in electric power—there has been such a public outcry against the environmental dangers of power production that the utility industry has not been able to build

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"We have reached an awareness of the seriousness of our water pollution . . . , notes this author, who points out that "the major impetus for water pollution control has been federal law. . . ."

Water Pollution

BY HARVEY LIEBER

Director, Washington Semester Program, The American University

WATER POLLUTION is not just a problem of municipal and industrial wastes. It is a Santa Barbara oil spill, a Rhine River fish kill, the oily Cuyahoga River catching fire, 28,000 pounds of Lake Michigan salmon with dangerous levels of DDT seized by the Food and Drug Administration. It is a sterilized stream destroyed by acid wastes from an abandoned mine in Appalachia, a hepatitis outbreak in New York City from eating contaminated clams, excessive salt brine in the Rio Grande limiting irrigation on both sides of the border, and it may be earthquakes and ground-water contamination near Denver, possibly caused by the deep-well storage of toxic chemical wastes.

Water pollution is at the root of an endless list of problems—varied, complex and not easily given to simple or uniform solutions. Yet delays in control are now probably due more to political and institutional obstacles than to scientific unknowns.

At the turn of the century, water pollution was primarily a public health problem. Typhoid fever, endemic diarrhea and dysentery from water-borne bacteria were leading causes of sickness and death. The development of water supply filtration and chlorination techniques has largely eliminated these concerns. Yet more than 50 years later, pollution ranks with poverty and prejudice as a major national concern.

The two basic problems featured in any discussion of water pollution are population

growth and accelerating industrialization. Since 1900, our population has nearly tripled and our industrial use of water has increased more than eleven times. However, a deeper analysis reveals that the interrelated factors of urbanization, higher standards of living and changing technology offer a more sophisticated explanation for increasing water pollution problems. The fact that 70 per cent of our population lives in metropolitan areas means that septic tanks for sewage will no longer suffice. Similarly, large-scale treatment plants are necessary when one-half of our population lives on 1.5 per cent of the land surface. More bathrooms, garbage disposal units, washing machines and garden sprinklers—symbols of “better living”—have also led to greater demands for water. Water use by individuals has soared to more than 150 gallons per day. Finally, our rapid technological developments have resulted in increased production of complex industrial wastes which are discharged into watercourses. Many of these synthetic chemicals, acids and pesticides are not amenable to normal treatment methods and may have long-range toxic effects.

TYPES OF POLLUTANTS AND EFFECTS

Present-day problems can be classified under the following categories of pollutants entering our waters:

Organic or oxygen-demanding wastes. These wastes are contributed by domestic sewage and industrial wastes of plant and

animal origin which remove oxygen from water through decomposition processes. Since fish and other aquatic life depend on oxygen for life, these wastes must be controlled or the aquatic life forms die.

Infectious agents. These include bacteria and viruses which may transmit diseases from domestic and animal wastes and from tanning and meat-packing plants. Viruses resist disinfection and can grow in non-living systems and so are an even greater danger than bacteria.

Plant nutrients. Nitrogen and phosphorus are the two main nutrients which promote nuisance growths of algae and water weeds that may interfere with treatment processes and cause unpleasant taste and odor problems. They may also upset the ecological balance of a body of water.

Synthetic organic chemicals. Detergents, pesticides and other synthetic industrial chemicals may be toxic to fish and aquatic life as well as harmful to humans. The synergistic effects of their reactions with other substances in water are largely unknown. Some are highly poisonous at very low concentrations and others have unforeseeable long term effects. We now know, for example, that the two million gallons of detergents sprayed on the *Torrey Canyon* oil spill killed more marine life than the oil itself.

Inorganic chemicals and mineral substances. This category includes metal salts, acids and solid matter reaching waters from mining and manufacturing processes, oil-field operations and agricultural practices. Besides interfering with natural stream purification, these substances may destroy aquatic life, harden water supplies, corrode treatment equipment and vessels, make water useless for irrigation and shorten animal (including human) life.

Sediment. As a result of land erosion, often from construction projects and poor agricultural practices, stream channels are filled by silt and so harm aquatic life, erode hydroelectric power equipment and increase treatment costs. This is a major problem because of the sheer magnitude of the amount of silt reaching waterways, currently esti-

mated at a billion tons a year from all sources.

Radioactive substances. These result from mining and processing of radioactive ores, and from the use of refined radioactive materials, in nuclear reactors and in industrial and research facilities and hospitals. As nuclear reactors increase, the safe disposal of their wastes will become an increasingly serious problem.

Heat. Temperature increases, often of 10 to 20 degrees, result from the use of water for cooling purposes by power plants and industries. This thermal pollution reduces the capacity of water to absorb oxygen, accelerates all chemical reactions and invariably affects aquatic life.

In practice, most wastes are a mixture of these eight types of pollutants, which makes it more difficult to treat and control them. For example, land drainage often contains much organic matter as well as sediments and possibly radioactive substances washed from vegetation and streets during rainfall, while industrial waste may contain oxygen-consuming wastes, detergents and substantial amounts of heat. Besides the immediate and long-range health hazards from contaminated water, there are many other detrimental effects. Pollution may be defined as an impairment of water quality making it unsuitable for drinking or other desired uses, recreational, agricultural or industrial.

In regard to aquatic effect, pollution was the cause of the death of 15 million fish, reported killed in 1968. The largest fish-kill incident was caused by refinery wastes, which killed four million fish as well as causing stream sudsing, while the second largest reported kill was from municipal wastes. Besides preventing the survival of shellfish and other wildlife, water pollution closes down bathing beaches and ruins other recreational areas, limits boating and may even corrode vessels.

Aesthetically objectionable and offensive to sight and smell, pollution may also stunt community growth by depreciating property, for example, reducing the value of waterfront areas. It can contaminate irrigation

and stock water and discourage industrial and community development by decreasing needed water supplies. It may even lead to possible long-term destruction of the oxygen-manufacturing capacity of algae and eventually all higher forms on earth. Equally significant, but on perhaps a higher moral plane, is an emerging ecological conscience which values a liveable environment and recognizes an individual's right to live in pleasant surroundings free from improvident destruction or pollution.

MAJOR SOURCES OF WATER POLLUTION

The leading source of man-made water pollutants in the United States is manufacturing, followed by domestic or municipal wastes. In 1963, the last year for which figures are available, manufacturing generated about three times the amount of wastes produced by the 120 million people (of a total of 189 million) who were served by sewers. This proportion is close to four to one today. Also, compared to domestic sewage, industrial wastes are much more likely to contain complex compounds which are harder to treat and remove. Finally, industrial production is growing at a much higher rate than population, which makes industrial wastes an even greater potential problem.

Among the industries creating the most pollution are chemicals, primary metals, paper and textiles, food products and petroleum refining. However, in the last few years industrial expenditures for pollution control have greatly increased. The Federal Water Pollution Control Administration has estimated that they are now closer to the target of needed industrial waste treatment construction by 1973.

Domestic pollution from untreated or inadequately treated human wastes is a major but controllable problem. At the beginning of this century, of 76 million people, only 24.5 million lived in sewered communities and, of these, only one million persons had their sewage treated. Since then the sewered population has grown, but so has municipal sewage and the amount that is treated.

Today, 138.5 million Americans live in

sewered communities and over 90 per cent of them are connected to waste treatment plants. Their waste discharges reaching streams after treatment are now the equivalent of the raw discharges of about 56 million people compared to about 24 million in 1900. About 60 per cent of the waste water in these communities receives some form of secondary treatment and 30 per cent receives primary treatment. However, implementation of state-federal water quality standards will require secondary treatment for all of the sewered population by 1973. This upgrading of treatment will cost about \$10 billion, plus additional billions to prevent storm water overflows from combined sewer systems.

Agricultural wastes include sediment and silt from improper farming practices as well as pesticides, herbicides, fertilizers and feed lot wastes which wash into streams through runoff of rain or percolate through soil. In addition, irrigation return flows which dissolve important amounts of minerals and increase salinity are an important problem in the western states.

Mine drainage from abandoned or active mines is a serious problem in coal-producing areas, polluting more than 10,000 miles of streams in the United States. This pollution degrades waters through the formation of acid wastes and sedimentation and can extend further downstream than the coal field areas. Mine drainage pollution abatement costs may require outlays of up to \$7 billion.

Navigation and recreational activities also cause pollution. Specifically, wastes from the more than 8 million watercraft that navigate United States waters consist of bilge water, sanitary sewage, garbage and oils discharged accidentally or intentionally. Two special problems are the danger of waste discharges near public water supply intakes and the opening of the Great Lakes to 90 per cent of the world's commercial vessels by the St. Lawrence Seaway.

EMERGING PROBLEM AREAS

Besides controlling domestic and simple industrial wastes and the more exotic pollu-

tants, there are a host of new problems on the water pollution agenda for the 1970's. Among these emerging areas of concern are the following:

Lake eutrophication. There is a need to halt the accelerated and unnatural eutrophication or aging of lakes, symbolized by the "dying" Lake Erie. In particular, effective substitutes must be devised for high phosphate detergents which speed up this aging process by stimulating excessive plant growth.

Estuarine destruction. The ecologically irreplaceable wetlands, marshes and swamps are rapidly being destroyed by pollution and dredging for residential, industrial and harbor developments. These estuarine areas, where the land meets the sea, are found in 26 coastal states and territories and contain more than a million acres of valuable waters and wetlands. About one-third of the nation's population and industry is concentrated in 258 bordering counties and pose an immediate threat to these underdeveloped and unexploited areas. Only programs to preserve and restore the quality of the estuarine zones can preserve them from further destruction.

Ocean pollution. While it was quickly realized that our rivers and streams could not endlessly assimilate wastes, until recently many thought that our oceans had an endless capacity to absorb pollution.*

Environmental effects of power generation. The use of electricity doubles every ten years in the United States. As more nuclear reactors are built to meet this demand we may expect intensified controversies over thermal pollution and the disposal of radioactive wastes. By 1980, it is estimated that 200 billion gallons a day, one-sixth of all available fresh water, will be used for such cooling purposes. Similarly, the long life of radioactive substances will make it more difficult to store and dispose of these hazardous materials safely. This problem is at the heart of the dispute over radiation standards between the Northern States Power Company and the Minnesota Pollution Control Agency

* *Ed. Note:* See "Ocean Resources," *Current History*, June, 1970, pp. 349ff.

because of plans to build a nuclear generating plant on the Mississippi River.

Health effects of new chemicals. It is estimated that American industry turns out a new chemical every 20 minutes. In 1943, for example, there was one synthetic pesticide on the market. Today, as agricultural chemical usage doubles every 5 years, there are more than 100 pesticides, available in thousands of different forms. Yet very little is known of the possible effects of these complex compounds on human health. It is difficult to ascertain how to treat these chemicals, how long they persist, or their long-range toxic and ecological effects even when absorbed in relatively low concentrations. Concern is growing among geneticists and biologists, for example, that the long-term mutagenic effects of the powerful toxin, chlorine, used in water supply and waste treatment may be more harmful to the animal species than the diseases it controls. We may therefore anticipate periodic bannings of new substances, similar to past cyclamate and DDT controversies, as their effects suddenly become suspect.

FEDERAL LEGISLATION AND PROGRAMS

The major impetus for water pollution control has been federal law, which dates back to 1886 with the enactment of a bill by Congress which forbade discharge of refuse and other impediments to navigation in New York Harbor. This was followed by the Rivers and Harbors Act of 1889 which prohibited the discharge or deposit into navigable waters of any refuse matter from ships or manufacturing establishments other than that flowing in a liquid state from streets and sewers. The Public Health Service Act of 1912 authorized investigations of water-borne diseases and surveys of water pollution. Finally, the Oil Pollution Act of 1924 prohibited oil discharges that would damage aquatic life, harbors and docks and recreational facilities from ships into coastal waters.

The first comprehensive legislation directing the federal government to control water pollution was passed in 1948 (P.L.80-845). It gave the states primary responsibility for

pollution control and limited the federal role to research and information dissemination, training and technical assistance. However the 1956 Water Pollution Control Act (P.L.-84-660) greatly broadened the federal role. It established a system of federal construction grants for municipal waste treatment facilities and gave the federal government enforcement authority in cases of interstate pollution. This authority was further broadened by the Water Pollution Control Act Amendments of 1961 (P.L.87-88).

The 1966 Water Quality Act (P.L.89-234) called for all states to set water quality standards for their interstate and coastal waters. Once approved by the Secretary, ** they became federal standards and were subject to federal enforcement. This act also authorized a new agency, the Federal Water Pollution Control Administration, which was transferred in May, 1966, from the Department of Health, Education and Welfare to the Department of the Interior. The Clean Waters Restoration Act of 1966 (P.L.89-753) greatly increased the authorizations of sewage treatment grants and transferred administration of the Oil Pollution Act from the Secretary of the Army to the Secretary of the Interior. Most recently, in 1970, Congress passed H.R.4148 which would control oil spills, thermal pollution, vessel pollution and the discharge of acid mine wastes.

At present, all the states have standards and water pollution control laws, many passed recently to comply with the federal acts or updating earlier health laws which were generally not enforced.

Thus, until recently, the basic federal approach, devised by Congress and administered by the Federal Water Pollution Control Administration, has emphasized three main programs: research, enforcement and construction grants. Research activities have attempted to meet the challenge of new types of pollution and to develop workable methods of advanced waste treatment, and to provide technical assistance and manpower training. The enforcement provisions of the act specified a lengthy three-stage process of

conferences, public hearings and, finally, court action against pollution of interstate or navigable waters in which health or welfare was endangered. As a result, until 1970, out of 46 enforcement proceedings only one case reached the state of court action, although compliance and implementation schedules were agreed to in other cases. With regard to the construction grants program, since 1956 \$1.5 billion of federal aid has been given to 9,600 municipalities and sanitary districts to support the construction of \$6.6 billion in new and expanded facilities to treat wastes. Yet, even here, grants have not kept up with needs.

The imaginative but complicated approach to water quality standards in the 1965 act provided for federal-state collaboration in their establishment and administration. The standards include three main elements: 1. the use to be made of a particular stretch of water, such as swimming, drinking, or industrial use; 2. scientific criteria and limits on specific pollutants; and 3. an implementation plan with timetables for construction by cities and industries of waste-treatment facilities and other measures to meet water quality standards. However, not all the state standards have been fully approved by the Secretary and it will take several more years before the standards program is expected to begin to show results.

The federal government's water quality effort is not confined to this one bureau of the Interior Department. It is estimated that 38 agencies have programs affecting various aspects of water pollution control. The Public Health Service has responsibilities for the health aspects of water quality while the Department of Housing and Urban Development has programs for funding water and sewer grants. In addition, the Economic Development Administration of the Commerce Department offers grants and loans for water and sewer systems in certain depressed areas while the Farmers Home Administration finances up to 50 per cent of the cost for plans and construction of rural water and sewer systems.

Under the present federal system, the state

** Originally of H.E.W., then of Interior.

water pollution control programs are engaged in administering water quality standards and enforcing their state laws. The localities construct and operate sewage treatment plants, often with some state aid as well as with federal grants.

RECENT DEVELOPMENTS AND PROBLEMS

Despite these programs, the problems are still immense. There are not enough waste-treatment plants; existing ones are not efficient enough in design or operation; and they cannot effectively remove many of the newer types of pollutants, such as heat, radioactive substances, sediments, pesticides, acids and dissolved minerals.

Cost and treatment projections for the future are also staggering:

... pollution problems will probably increase as the economy grows. If, for example, industrial production tends to grow 4½ per cent per year, it will have increased four-fold by the year 2000 and almost ten-fold by 2020. Unless there are changes in technology or the composition of output, the total weight of the materials going through the economy, and the wastes generated will have increased by a like amount. . . .¹

If all municipal wastes were treated and if the effectiveness of treatment were raised to 85 per cent, on average, actual municipal discharges into rivers would still be greater in 1980 than they were in 1962, and would have doubled by 2020. If, on the other hand, we raised the effectiveness of all treatment to 95 per cent, municipal waste discharges into rivers would probably decline over the next 60 years. But 95 per cent goes to the outer limits of present technology, and would perhaps triple or quadruple treatment costs.

One estimate puts the costs of building and operating treatment plants that would remove at least 85 per cent of the organic wastes from both municipal and industrial effluents by 1973 at over \$20 billion, or \$4 or \$6 billion a year.²

In addition, Senator Jennings Randolph, Senate Public Works Committee Chairman, has predicted that by 1980 we will produce enough sewage and other waterborne wastes

to consume all of the oxygen of all the flow in dry weather in the 22 river systems of the United States.

The situation is particularly critical in regard to municipal waste treatment facilities. Federal construction grants have been funded considerably below authorization levels and municipal investment in these facilities is running at less than half of the estimated needs.

However, recent congressional initiatives for a recognition of the seriousness of present ecological trends and the need for a reassessment of general environmental policies have been followed by the Nixon administration's present emphasis on this problem. The most significant recent legislative accomplishment has been the passage of S. 1075, Senator Henry Jackson's (D., Wash.) National Environmental Policy Act of 1969. It contains a declaration of national environmental policy and goals, establishes a Council on Environmental Quality and provides for a review of federal programs for their impact on environmental quality. The most controversial part of this legislation directs every government agency to adjust its policies and carry out its functions in conformance with the stated congressional policy on the environment. A finding on environmental impact and effects would be required in every recommendation or report on legislative proposals and other major federal actions significantly affecting environmental quality by the responsible agency official.

A series of presidential statements and messages in 1970 indicates that pollution problems now have top priority; the administration has almost preempted pollution as a political issue. Although initially unenthusiastic about the National Environmental Policy Act when he signed it on January 1, 1970, President Richard Nixon strongly praised the new legislation, saying that it was a "particularly fitting" first act of the new decade. He then followed up his statement that "it is literally now or never" by selecting three distinguished conservationists for the Council and by proposing in his first State of the Union Message a

¹ U. S. Department of Health, Education and Welfare, *Toward a Social Report* (Washington, D.C.: Government Printing Office, 1969), p. 28.

² *Ibid.*, pp. 32-33. See also Marshall Goldman, "Costs of Fighting Pollution," *Current History*, August, 1970.

national growth policy that would stress qualitative improvement rather than quantitative growth.

An ambitious environmental pollution message of February 10, 1970, advanced a broad program of legislative and executive actions on a wide front.* A 37-point program for water pollution was recommended including stronger enforcement and a new construction grant program. The President proposed a \$4-billion program of federal grants to local governments for waste treatment plant construction, supplemented by investment banking assistance through an Environmental Financing Authority in order to stimulate \$10-billion worth of municipal construction. Succeeding presidential statements and a study of possible consolidation and reorganization of environmental agencies also indicate a continuing awareness of the immensity of these problems and a willingness to tackle them. Finally, the administration has stepped up its enforcement program and has been attempting to carry out the long-standing official policy requiring secondary treatment of all wastes and the nondegradation of streams below their existing water quality.

FUTURE TRENDS AND SUGGESTIONS

Amid predictions of disaster, some encouraging signs can be noted. The public is now fully aroused to the threat of pollution. Congress and the administration are responding to this concern with new programs, ideas and additional money.

Technologically, it is safe to predict that higher degrees of treatment will be required and put into operation. Secondary treatment which removes about 85 per cent of the wastes will soon be a barely acceptable minimum and much more costly tertiary treatment, with removals of 95 per cent, will become common. Today's waste treatment technology was developed more than a half century ago, and so it is likely there will soon be workable advanced waste treatment methods to deal with the new pollutants and simple municipal and industrial wastes.

* Ed. Note: For excerpts from this message, see *Current History*, June, 1970, pp. 362ff.

Technology, the application of science to practical tasks, is a two-edged sword. It concentrates on immediate economic effects and often ignores long-range environmental impact. Yet, at the same time, its inventions promise to reverse the trend towards environmental degradation. Scientists are beginning to concentrate on utilizing waste for beneficial purposes, such as using warm-water irrigation from thermal pollution to stimulate plant growth and to protect fruit trees from killing frost; converting dairy whey into salable food products; using domestic sewage as compost; and deriving protein from petroleum wastes, yeast from industrial wastes and sugars from pulp wastes.

These and similar ideas for reuse and effective recycling of wastes in our interdependent system of land, water and air are especially applicable to water pollution. There is no economic or medical reason why we cannot repurify water and so drink our sewage, even several times over. In fact, cost estimates show this to be a far cheaper method of obtaining fresh water than by desalination of the ocean.

Finally, we may also expect the development of sophisticated water pollution and environmental quality prediction and warning systems which will indicate the overall state of the ecology and pollution trends. These indices and models will enable us to analyze and predict crises and threats and so prepare for them.

GOVERNMENTAL TRENDS

Municipal waste treatment plant needs will probably be met with the enactment of present legislative proposals. But in succeeding years, provision will have to be made for the rehabilitation of collecting systems and sewers as well as for an attack on urban runoff from combined sewer systems.

The far greater problem of industrial pollution, however, has hardly been dealt with legislatively even though more than one-half of the wastes entering municipal treatment plants are of industrial origin. Industrial incentives or subsidies—whether in the historic form of investment tax credits or now

under accelerated depreciation writeoffs—are initially appealing. Yet it is doubtful if they are the best means of reducing industrial pollution.

The ideal system would encourage industry to utilize the most efficient technological option, whether it is after-the-fact waste treatment, flow augmentation, stream reaeration, joint treatment of municipal and industrial wastes, process redesign, recycling of wastes or byproduct recovery. Therefore economists such as Allen Kneese have proposed an effluent charge which would tax each plant on the basis of the quantity and quality of the effluent discharged and its effect on the receiving waters. At present, this proposal is unacceptable both to conservationists and industrialists although they do support the second basic element in this scheme—a basin- or area-wide agency to administer the control program.

Other intriguing proposals are environmental contamination taxes and waste disposal charges on manufacturers. One such approach is already being employed in the Virgin Islands where the Hess Oil Company pays a royalty of 50¢ a barrel on the oil it refines. This goes into a special conservation fund where it is utilized for the control of air and water pollution, urban beautification and other conservation projects.

It would therefore be particularly rewarding if economists and public administrators joined forces in devising workable and equitable systems and laws which would offer incentives to closed production systems to internalize costs by reprocessing wastes. Also needed are means to build environmental constraints into design specifications and industrial site locations. Hopefully, once these initial studies have been made we can tackle the larger question—organizing total management systems which would include anticipatory assessment of technological impact, costs and consequences.

More attention should be given to the feasibility of regional control mechanisms such as the Delaware River Basin Commission or the San Francisco Bay Conservation and Development Commission. An-

other neglected area is assessment of the effectiveness of the carrots and sticks by which the federal government is attempting to induce local and state governments to upgrade their control efforts. In particular, the value of incentives to states, such as matching program grants, has been insufficiently recognized. It can, for example, be argued that in the long run the \$15 million given this year to state water pollution control agencies will have a more significant effect than the \$800 million municipal waste treatment construction grant funds.

Water quality cannot be separated from its adjoining land usage. Thus S.3354, Senator Jackson's proposed National Land Use Policy Act, may be a landmark in legislative initiative as significant as his Environmental Policy Act. Under S.3354 the federal government would administer grants in aid to states to develop and implement land-use plans. The states would have to allot land for future industry, recreation, homes and natural preservation. Failing to comply, they might be denied federal highway funds. Presumably local zoning plans would have to give way to long-range state plans; hopefully we could avoid disputes in the future, such as the disputes over the location of the giant Everglades jetport or of the B.A.S.F. chemical plant in South Carolina.

In regard to these and other controversies, the use of legal tools in the struggle against environmental degradation is growing. The successful efforts of the Environmental Defense Fund against the use of DDT, or the Scenic Hudson Preservation Conference's find against the Consolidated Edison's Storm King project and the suit by conservationists

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"A concerned public holds the key to eventual success for environmental efforts. Without a sustained effort by millions of citizens, the best administered programs can fail."

Pollution and a Concerned Public

BY GAYLORD NELSON
United States Senate

RARELY HAS ANYTHING been more romanticized than the air pollution of "foggy" Londontown. Victorian English literature would not have been the same without the London fog. Charles Dickens wrote of black soot particles which resembled snowflakes "gone into mourning for the death of the sun." T. S. Eliot wrote about the "yellow fog that rubs its back upon the window panes." Joseph Conrad and other novelists wrote books in which London's fog played a prominent part.

But today London's fog has virtually disappeared—and literature is the only loser. Only some three or four times a year does anything remotely resembling the fog of yore descend on the city and, even then, it is never the suffocating and sometimes lethal fog that it used to be.

The catalyst for a mammoth clean-up program was supplied by a disastrous smog that hit London in December, 1952, lasting for three days and killing 4,000 persons. This grim occurrence led to the Clean Air Act of 1956, which brought the gradual creation of smoke-control areas across the entire United Kingdom. Now, 74 per cent of London is covered by the control orders banning the burning of soft coal, and 80 per cent less smoke is emitted by homes and factories than was the case in 1952.

As a result, researchers say that the health of London's citizens has improved; the weather is much more pleasant and enjoyable to residents and tourists alike; and the clean

air has inspired the scrubbing of such celebrated structures as the Tower of London, the National Gallery, Nelson's Column in Trafalgar Square, Westminster Abbey, St. Paul's Cathedral, and Buckingham Palace. In addition, plants and wildlife are thriving and long-absent birds have reappeared on the scene—138 species today compared with less than half that number 10 years ago.

London is a shining example of a city that tackled its air pollution problem successfully, with the help of a national Clean Air Act. But it cannot afford to rest its efforts now. While it still basks in the sunny success of its recent efforts, the auto boom threatens to return the city in the next few years to the days of haze. In an effort to meet that problem before it reaches crisis proportions, England has become the first country to put the electric auto into mass production.

In the United States, where the automobile causes 60 per cent of the country's air pollution (up to 90 per cent in some cities), the state of California in 1960 pioneered air pollution control legislation. And none too soon: with knowing looks at the growing clouds of smog, natives whispered that the end was near—the birds in Los Angeles had begun to cough.

By 1965, thanks to the spadework in California, the auto industry could no longer avoid federal legislation. The 1968 models were the first to be affected, and more stringent federal controls were required of 1970 and 1971 models. Further smog reductions,

which will leave our air cleaner, have been mapped out through 1980.

In the process, the internal combustion engine may have to go by the boards. A bill I introduced in the Senate would ban the internal combustion engine in 1978 if it does not meet certain emission standards. The bill provides for the development of alternatives to the internal combustion engine by 1976, the 200th anniversary of this country's independence.

The London and Los Angeles examples show that statewide, regional and national legislation is needed to deal with the environmental crisis. By nature, pollution problems span governmental jurisdictions, requiring cooperative action at all levels of government.

A NATION-WIDE PROBLEM

DDT sprayed on crops is carried far afield by wind and erosion and is absorbed by every living creature all over the world. It threatens the very survival of many species. Petroleum spilled from the U.S. Steel plant at the southern tip of Lake Michigan helps pollute the shores of Illinois, Indiana, Michigan and Wisconsin. Atomic radiation and nerve gas are carried by vagrant winds from testing sites to grazing land and even to metropolitan areas. Cities can dump raw sewage into a river flowing through them and extend the problem to all cities downstream.

Economic pressure on local units of government is particularly heavy. Sometimes allowing an industry to enter an area with an eye to the taxes it will pay is the only alternative a small community has to an unwanted jump in the general tax rate. Often an already present industry is the backbone of the community's economy and its interests influence decisions made by the local government. For example, Pima County, Arizona passed an air pollution ordinance that was high minded and effective in all but one respect: it exempted the copper smelting plants which are responsible for 90 per cent of the local air pollution.

Following the Federal Clean Air Act of 1967, Nevada adopted an air pollution control law which air pollution control officials

described as "industry oriented." Since 1967, in Clark County (which includes Las Vegas), more than 1,000 "notices of violation" of even the mild existing regulations have been issued. Of these, only 35 cases have gone to court, and among these, there have been only three convictions. The highest fine imposed was \$75.

Of course, political, bureaucratic and economic realities are not always the deciding factors in determining the success of anti-pollution measures.

Los Angeles has used a very successful formula for reducing industrial pollution: it offers the pollution sources a reasonable time to install fume control equipment or stop operating. Unfortunately, too many government units take the approach of imposing "after-the-fact" sanctions in which officials have to wait until a facility actually contaminates the air before beginning tortuous abatement proceedings that can end in no more than citation for a misdemeanor.

It is an encouraging aspect of the environmental picture that the public has begun to play an active part. Public opinion in action saved the San Francisco Bay from property owners who wanted to extend their land into the bay, and from the city of Berkeley which proposed to increase its size greatly by filling in 2,000 acres of the bay.

As reported in the April, 1970, issue of *The Progressive*,

What happened next was an inspiring example of the power of an angry citizenry when aroused by a ruthless assault upon the environment. Mrs. Clark Kerr, wife of the then president of the University of California, and two friends enlisted the aid of the Sierra Club, the Save the Redwoods League, the Audubon Society, and other groups to save the Bay. The Save San Francisco Bay Association was formed and with the support of thousands of citizens defeated the Berkeley Bay fill plan by making it a local election issue.

From this success, the Association went on to a broader approach. It lined up some key leaders of the California legislature and with massive citizen support succeeded in getting a bill passed that created a Bay Conservation and Development Commission to explore ways of developing San Francisco Bay's maximum values without harming its scenic or recreational potential. A

key provision of the law prohibits any new fill during the Commission's three-year study without a public hearing and Commission approval.

There was influential opposition to the legislation but Association members turned out en masse at Sacramento when the bill was before the legislature, flooded lawmakers with petitions, letters, telephone calls, and telegrams. Some inventive Oakland citizens mailed small bags of sand to their legislators with tags that read: "You'll wonder where the water went, if you fill the Bay with sediment."

The Commission's report, submitted in January, 1969, declared that the Bay must be protected as an asset belonging to the people of the area, state and nation. Powerful interests are lobbying against the Commission's position, but the citizens who halted the real estate developers and the industrial demand for land fills realize that while they have won a major battle, the war to save the Bay still goes on.¹

In another example of the power of the public, the voters of New York in November, 1969, approved in a general election a constitutional amendment that gave the state government new powers and responsibility to stop air and water pollution, end unnecessary noise, and protect wetlands, shorelines and other priceless resources from reckless development and exploitation. The amendment passed by a margin of five to one, the greatest margin for any constitutional change in the history of New York. Other states, including Illinois, Massachusetts, Colorado and Maryland, are now embarked on similar attempts at legislation.

Other citizen efforts, notably the ones to save Seattle's Lake Washington and Florida's Everglades, have met with success. The concept is gaining that nature belongs to the people and that encroachments on it or degradations of it are contrary to the public interest.

A Gallup Poll taken for the National Wildlife Federation last year revealed that 51 per cent of all persons interviewed were deeply disturbed about the grim tide of pollution.

Growing student concern about the environment is a striking new development. A freshman college student attitude poll, conducted last fall by the American Council on

Education, found that 89.9 per cent of all male freshmen believed that the federal government should be more involved in the control of pollution.

EFFECTS ON CONGRESS

Other national and local polls, the rising citizen attendance at public hearings on polluters, the letters that are pouring into Congressional offices—all indicate a vast new concern. As a dramatic indication of the degree to which the new citizen concern has reached Congress, more requests for information on environment come into the Legislative Reference Service (the research arm of Congress) than any other issue, including the traditional front-runners, crime and Vietnam.

In the *Congressional Record*, the amount of environmental material inserted in 1969 by Senators and Congressmen was exceeded only by material on Vietnam.

Congress in 1969 took the major initiative of appropriating \$800 million in federal water pollution control funds—nearly four times the request of the present and previous administrations.

Concern for the environment has only recently jumped to the fore in the United States, but there can be no question that it has become an issue of paramount importance, with enormous public support. When I proposed a national Environmental Teach-In in September, 1969, in a speech in Seattle, I hoped for a good response but did not anticipate one so overwhelming—extending to 2,000 colleges, 10,000 high schools and 2,000 town halls across the nation. Nor did I expect that the movement would be endorsed by such divergent groups as the United Auto Workers and the American Library Association.

The nation has begun to recognize a disturbing new paradox: The mindless pursuit of quantity is destroying—not enhancing—the opportunity to achieve quality in our lives. In the words of the American balladeer, Pete Seeger, we have found ourselves "standing knee deep in garbage, throwing rockets at the moon." Cumulatively, Pro-

¹ *The Progressive*, April, 1970, pp. 62-63.

gress American Style adds up each year to 172 million tons of smoke and fumes, seven million junked cars, 100 million discarded tires, 20 million tons of paper, 48 billion cans, and 28 billion bottles. It also means bulldozers gnawing away at the landscape to make room for more unplanned expansion, more leisure time but less open space in which to spend it, and so much reckless progress that we face even now a hostile environment.

Today it can be said that there is no pure air left in the United States. Scientists are in general agreement that the last vestige of pure air was consumed near Flagstaff, Arizona, about six years ago.

Today it can also be said that there is no river or lake in the country that has not been affected by the pervasive wastes of our society. On Lake Superior, the last clean Great Lake, a mining company is dumping 60,000 tons of iron ore process wastes a day directly into the lake.

Tomorrow? Responsible scientists have predicted that if they are not checked, accelerating rates of air pollution could become so serious by the 1980's that in many cities people may be forced on the worst days to wear breathing helmets to survive outdoors.

It has also been predicted that in 20 years man will live in domed cities. Paul Ehrlich, an eminent California ecologist, and many other scientists predict the end of the oceans as a productive resource within the next 50 years unless pollution is stopped. The United States provides an estimated one-third to one-half of the industrial pollution of the sea. It is especially ironic that, even as we pollute the sea, there is hope that its resources can be used to feed tens of millions of hungry people.

In the face of it all, we must carry in our minds continually the chilling awareness that the fate of mankind itself may hang in the balance. If man can push hundreds of other species off the face of the earth, he can write his own obituary, too.

The sharpest indication that man can degrade his environment enough to threaten

his own existence is that already he has caused the extinction of other species. S. Dillon Ripley, secretary of the Smithsonian Institution in Washington, D.C., believes that in 25 years somewhere between 75 and 80 per cent of all the species of living animals will be extinct.

Until recent years, species vanished at the rate of one per thousand years. At present, one species is dying out every year. For example, in just 100 years we exterminated five billion passenger pigeons.

The World Health Organization estimates that in the last 100 years over 550 species of mammals, birds and reptiles have been pushed to the brink of extinction. Unlike the dinosaur, which died out over a time span of millions of years, endangered species today are being wiped out in a second of geologic time. One hundred and ten kinds of mammals alone have succumbed in the Christian era, 70 per cent of them in the last century.

At present, the Department of the Interior's Office of Endangered Species has placed 89 creatures on the endangered list and has listed another 44 as rare. Included are the eastern timber wolf, the grizzly bear, the key deer, the jaguar, the American peregrine falcon, the whooping crane and the lake sturgeon.

An alarming aspect of this situation is the insidious way in which species are eradicated. No one wishes for their deaths. The Bermuda petrel, a rare oceanic bird of the North Atlantic that has no contact with any land treated with insecticides, nevertheless lays eggs with 6.4 parts per million of DDT residues, acquired through eating contaminated sealife. Similarly, the eagle and the osprey face extinction because herbicides diminish their capacity to produce calcium and their eggs are no longer strong enough to contain the chicks.

The fate of these creatures cannot be decided through legislation, because the birds pay no attention to boundary lines. Some countries, notably Sweden and Denmark and, recently, Canada, have banned DDT. But that is just a beginning. Soil erosion, the

tide and the chain of life itself carry pesticides to the farthest reaches of the world without regard to boundaries. In Antarctica, as remote a spot as there is in the world, 2,600 tons of DDT are estimated to have accumulated in the snow and ice.

Man is a more adaptable creature than many of the species he has endangered. He manages to survive in Arctic igloos, in steamy tropical jungles and in cities of concrete and steel. But adaptable as he is, he is part of the ecological system and by damaging the system he can make earth uninhabitable for himself.

JURISDICTIONAL CONFLICTS

The battle against pollution must overcome the jurisdictional boundary lines that carve the planet into separate sovereignties. The urban sprawl centered in Portland, Oregon, has 452 municipalities—local governments that under normal conditions operate without regard to one another; other metropolitan areas have similar jurisdictional difficulties. The problems are compounded when they are encountered on the international scene.

Some examples dramatically point up the need for international solutions to pollution problems:

An oil tanker from Country X ruptures a seam, and oil gushes out to mar the beauty of Country Y's beaches and to kill its sea fowl, marine life and underwater vegetation;

Rising acidity in rain and snow, attributed to wastes from Britain and possibly West Germany, threaten to destroy freshwater fish and forests in Norway if not controlled;

Radioactivity from an atom test in Country A spreads to far-off Country B, imperiling Country B's milk products;

Chemicals used by a large power at war in a small country create a fear that the chemicals may sterilize the land or at least drastically reduce its agricultural output for many years, or even permanently.

A report issued by the Secretary General of the United Nations in May, 1969, found a need for international agreement in the areas of radioactive fallout; protection across

boundary lines for migratory birds, mammals and reptiles; and agreements in matters affecting the weather and climate.

These international problems fall within the purview of the United Nations. They are non-ideological in nature, and they affect all the inhabitants of the world, human and otherwise. The U.N. Conference on Human Environment to be held in Stockholm in 1972 is a major first step toward using the United Nations to solve international pollution problems.

A study body operating under the auspices of the United Nations and funded by it would be a good start for a continuing attempt to monitor global environmental problems and to initiate proposals for meeting them.

To the extent that borders and political and economic interests are allowed to fragment and to weaken efforts to overcome environmental problems, those attempts will fail. But a very important ingredient in the battle to win back a quality environment is the will of the people, and the will is clearly present. It is now within the power of the people to elect to office candidates with strong environmental programs and deny office to those who are lukewarm on the environment.

Any rational approach to pollution or conservation matters requires the elimination of national and local rivalries. People the world over must start to think of one another as brothers with common afflictions and common needs.

Together, we can elect environmentally-committed candidates and then demand that they work for a quality environment. A concerned public holds the key to eventual success for environmental efforts. Without a sustained effort by millions of citizens, the best administered programs can fail.

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Gaylord Nelson was the Governor of Wisconsin from 1958 to 1962 and was elected United States Senator in 1963. Among his Senate posts is membership on the Committee of Interior and Insular Affairs.

“Students of natural resource politics frequently view policy outcomes in this field as the self-interested pronouncements of cozy elites. . . .” But although “public land policy of the nineteenth century was arrived at in much this manner,” this author points out that “overwhelmingly, public resource use is now determined in a process regularly referred to as ‘pluralism.’”

Private Interests and Public Lands

By ROBERT S. GILMOUR

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CORPORATIONS, CONSERVATIONISTS and associated private beneficiaries of the federal domain have long been regarded as influential, perhaps the most influential of those who decide on disposal and use of public land resources. That private interests participate in nearly all administrative and legislative decisions affecting the timber, forage, mineral, water, wildlife and recreational resources on public lands is taken for granted.

Traditionally, conservation groups have been viewed as pitted in a continuous, stag-like battle with private economic interests to check wholesale despoilation and plundering of forests, parks and wild lands. As early as 1895, John Muir and his newly formed Sierra Club opened a vigorous campaign against loggers and stockmen who had “invaded” the Yosemite Valley. The continuation of that fight is still recognizable, in other sectors, fully three-quarters of a century later. Antedating even Muir’s famous efforts in the Far West, John A. Warder founded the American Forestry Association in 1873 to challenge “cut-and-get-out” loggers of the East and Midwest. But in this century the traditional picture of embattled conservationists and land users often obscures or miscomprehends a more complex reality involving shifting alliances of numerous governmental as well as nongovernmental participants. Indeed, conservation societies have

more than once found themselves on opposite sides of intense resource-use controversies. Some, such as the American Forestry Association, have been torn from within, experiencing the heft of industry memberships. Also, private interests are involved in different types of policy-making processes, regardless of whether the site of decisional power is Congress or the Executive Branch. Before examining the processes further, our attention is first directed to the participating private organizations, their goals, capabilities and political roles in public lands politics. No two interest groups hold precisely the same perspectives on the value of available land resources or identical claims to land use, but areas of common interest are identifiable and mutually understood within each of these private organizations.

CONSERVATION-RECREATION GROUPS

Specific organizational objectives advanced by groups in this general category range from wilderness and natural resource preservation to large-scale development of public land areas for mass recreation. Most do have one important feature in common: they serve no special economic purposes nor do they attempt to claim economic benefits for their members. There are exceptions, of course. The American Ski Association and the Outboard Boating Club of America, among others, clearly represent commercial recrea-

tion interests with definite economic stakes in land policy outcomes.

Groups of this sort participating most regularly in public lands decisions since World War II were the Izaak Walton League of America, the National Audubon Society, the National Wildlife Federation, the Sierra Club, the Wilderness Society, and the Wildlife Management Institute. This list is by no means exhaustive; nevertheless these are the organizations public lands officials and congressmen "expect" to become active when conservation values are at stake.

During the 1960's, newer groups of this type have also become frequent participants in policy-making. Among these are the Sport Fishing Institute, the Save-the-Redwoods League, Ducks Unlimited, and Friends of the Earth. Clearly, several of these groups have more specialized objectives than a general conservation society such as the Izaak Walton League. Accordingly, their participation has been selective.

Also important to conservation-recreationist goals, and to political contests involving those goals, has been support rendered by lobbying organizations with broad-gauged interests such as the A.F.L.-C.I.O., the Farmers' Union, the General Federation of Women's Clubs, the National Association of Soil Conservation Districts, and the National Grange—recruited by conservationists as a means of enhancing their coalitions and demonstrating their breadth of appeal.

Conservation and recreation associations vary considerably in their numerical strength and their organizational divisions as well as in their specific objectives. The venerable Izaak Walton League of America and the National Audubon Society in 1970 had, respectively, 55,000 and 100,000 individual memberships in several hundred local chapters

throughout the country. Each organization supports representatives in Washington to sustain lobbying activities, although its main headquarters are elsewhere.

National Audubon maintains an extensive staff of over 50 professionals in New York City where the society produces its handsomely tailored and politically sensitive magazine, *Audubon*. The Wilderness Society, which has tripled in size during the 1960's—to 60,000 members—has no subsidiary units. It does engage a highly active Washington staff of 25 persons to promote the preservation of federal wild areas and to inform members, regularly, of its progress and setbacks. The rapidly expanding National Wildlife Federation has a full-time staff of 21 to coordinate the activities of 8,600 local chapters and 480,000 associate members.¹

The Sierra Club, once a Far Western regional organization, has rapidly extended both its interests and its membership to the East.² Sierra Club headquarters remain in San Francisco, but there is now a New York City staff of nine and a Washington contingent of two. The club is almost invariably represented at important intergroup conservation meetings and congressional hearings held in Washington, not to mention those conducted in the West. The Wildlife Management Institute is the only national conservation group distinguished by substantial backing from private industry. Even so, the institute's goals and actions vis-à-vis divisive issues such as wilderness and wild rivers preservation are seldom compatible with those of the organized economic interests.

In most political controversies, national conservation and recreation organizations have found ready agreement according to the generally shared objectives of protecting natural resources on the remaining federal wild areas from industrial exploitation and developing more and better recreational facilities in existing multiple-use areas. But as the pressure for additional public facilities increases, a growing stress between preservation and recreation values and their organized expression appears to be inevitable. Tensions of this sort have already become

¹ Most of these members are described by the Federation's headquarters simply as "subscribers" to *National Wildlife*.

² The Sierra Club more than doubled in size during its much publicized 1968-1969 controversy with the Internal Revenue Service and the Interior Department concerning the club's lobbying activities. In losing its tax exempt status, the Sierra Club won a total membership of 90,000.

evident when organizations representing mechanized recreationists—skiers, motor boat enthusiasts and auto campers—have broken ranks with the traditional alliance. For example, the Outboard Boating Club of America submitted lengthy statements to Congress in the late 1950's and early 1960's opposing the proposed Wilderness Preservation Act in much the same terms as those employed at the time by various economic interests also opposed to the bill.

UNEASY PARTNERSHIPS

Historically, conservation-recreation groups have maintained an uneasy partnership with the United States Forest Service (Department of Agriculture) and the National Park Service (Department of the Interior) in many political contests. This accord does not withstand jurisdictional disputes between these two agencies, such as their struggle for the Oregon Dunes in the early 1960's. Conservation associations typically side with the Park Service, indicative of tensions inherent in the Forest Service's concept of multiple-use management. Conservationists have generally been even less enthusiastic about the operative multiple-use principle in the Bureau of Land Management (Department of the Interior).

In some of the controversies, such as the dispute over the wilderness preservation in its early stages, allied conservationists have opposed all three of these federal bureaus and, in this case, the Interior Department's Bureau of Indian Affairs in addition. In relation to land-managing agencies, conservation and recreation groups are not unlike economic interests concerned with public lands in wanting, as former Forest Service Chief Richard

McArdle put it, "to bolt down one particular use over large areas . . . priority over all other uses."³

ECONOMIC INTERESTS

Because of the diversity of corporate enterprise permitted on the public domain, the specialized interests of economic associations active in land politics are more varied and numerous than those of conservation and recreation groups. Nonetheless, each of these national organizations has the definite purpose of enhancing the conditions of access, exploitation and development of forest resources by its members. Most may be roughly classified according to the general types of resources—timber, forage, minerals and water power—most important to commercial operations of the companies and individual entrepreneurship they represent.

Privately owned wood lots continue to supply the major proportion of raw material for American forest products. But industrial dependence on the national forests, forest lands controlled by the Bureau of Land Management and forests on Indian reservations has increased steadily during the past decade. Representing the expanded resource needs of loggers, saw mill operators and forest products manufacturers are three large and consistently active national associations. Two of these, the American Paper Institute (A.P.I.)⁴ and the American Pulpwood Association, have their central offices in New York City. Both maintain continuous contact with the third and largest organization of this type, the National Forest Products Association (N.F.P.A.), located in Washington, D.C.⁵ The American Pulpwood Association has some 350 corporate members; the A.P.I. and N.F.P.A. each are federations of more than a dozen state and regional associations.

Subsidiary divisions of each national group, and individual corporations as well, participate in legislative and administrative decisions through their testimony at congressional hearings and through their informal meetings with congressional committee chairmen, with other congressmen, and with officials in the Departments of Agriculture and the

³ U.S. Senate, Subcommittee of the Committee on Appropriations, *Hearings: Interior Department and Related Agencies Appropriations Bill, 1963*, 87th Cong., 2d Sess., 1962, p. 1082.

⁴ Prior to 1965, the A.P.I. was known as the American Paper and Pulp Association.

⁵ Formerly known as the National Lumber Manufacturers Association, the N.F.P.A. is the oldest and largest of the national timber groups. It employs an exceptionally large Washington staff of 70 persons, more than twice the size of the A.P.A. and A.P.I. staffs combined.

Interior. Often this participation is the result of encouragement and guidance from the national organizations' leadership.⁶

Similar organizations articulate the interests of ranchers and stockmen utilizing the forage resources of the public range and the national forests and grasslands. The National Wool Growers Association, established in 1865, and among the oldest organized economic interests, represents approximately 20,000 members in 28 divisions. Even larger is the American National Cattlemen's Association, a confederation of 150 organizational members—40 state and 110 regional—which claims to represent 300,000 ranchers and breeders. Although these organizations have been heavily involved in resource policy-making, not confining themselves to grazing issues alone, neither maintains its headquarters in Washington.

Associations concerned primarily with the exploitation of mineral wealth (metals, petroleum and other subsurface resources) have not generally organized or confederated their lobbying activities beyond the state and regional level. One exception is the American Mining Congress, established in 1898, and currently maintaining a staff of 40 full-time employees in offices near the Capitol. The A.M.C. represents over 600 domestic mineral producers and seldom fails to advocate their interests during legislative contests concerning the application or change of the mining laws.⁷ A comparable national group representing oil and natural gas interests is the American Petroleum Institute. However, the A.P.I. has been no more active in public

conservation disputes than such regional associations as the Independent Petroleum Association and the Western Oil and Gas Association.

Individuals and companies with a stake in the development of water resources for electric power or reclamation purposes have also organized strong local and regional groups, but most of these are affiliated with the National Water Resources Association (N.W.R.A.). The Association has 5,000 members in 18 Western states and maintains a staff of five in Washington, D.C. Formerly known as the National Reclamation Association, the N.W.R.A. has long had a strong relationship with the Bureau of Reclamation in the Department of the Interior.

A diversity of forest-use goals among the several types of organized economic interests generates remarkably few intergroup conflicts, notwithstanding occasional disputes over the application of the mining and mineral leasing laws. General compatibility of their economic objectives with the prevailing Agriculture and Interior Department policies of multiple use⁸ of resources encourages the formation of loose intergroup coalitions across industry lines. Very often these are formed to defend the status quo of access to public domain resources and to counterclaim the persistent and increasing demands of conservationists. Consequently, interest group representatives in both coalitions regularly anticipate the performance of mediating or negotiating roles by those in relevant positions of governmental authority.

CAPABILITIES AND POLITICAL ROLES

The home office location of many national interest organizations is indicative of an important facility for sustained access to federal policy-making—physical proximity to the arenas of legislative and administrative power. Maintenance of well established staff headquarters in Washington promotes the development of interpersonal relationships, often of many years standing, between leading representatives of these associations and their governmental counterparts. Moreover, a confederal organization, common to most

⁶ Two especially active regional organizations are the Western Forest Industries Association and the Industrial Forestry Association. Each is located in Portland, Oregon, and represents nearly 100 companies in the highly productive forest areas of the Northwest.

⁷ Local and state groups in this category do not always agree with A.M.C. goals for federal policy. According to Marion Clawson and Burnell Held, some are "even hostile" to the A.M.C. *The Federal Lands: Their Use and Management* (Baltimore: Johns Hopkins Press, 1957).

⁸ An exception must be made for the Interior Department's National Park Service where the multiple-use principle extends only to preservation and recreation.

national groups, enables them to develop similar relationships with federal administrative officers in the field as well as nation-wide communications networks to transmit politically relevant information and for the activation of widespread popular support or demonstrations of economic impact. Not all the organizations discussed above have the advantages of these facilities, but those that do not have such facilities tend to ally themselves on a temporary or permanent basis with national associations situated more favorably for protracted legislative or administrative contests.

Other facilities of access and influence are less evenly distributed. For example, preservation and conservation groups continued to gain advantage from the prevailing myth of the "ravaging interests" long after the era of untrammeled land exploitation was substantially curtailed by congressional acts and tightened administrative regulations. Most conservation associations have also been able to exploit the surge of interest in outdoor recreation and the consequent popular demand for protection of publicly owned scenic and natural areas. Yet the sustained influence of these groups appears to be limited to the extent that they can arouse membership support in response to crises. This accentuates the strategic advantage in regularized instigation of conflict situations in order to avoid mass membership apathy and decline.

Economic organizations are less subject to cyclical variations in membership size and interest, primarily because they are better able to provide, consistently, both political and nonpolitical advantages important to the corporate lives and profits of their members. Although economic groups find it difficult to generate mass popular support for their policy stands, they are in a position to explain and justify resource claims in the language of national and local economic health. They are often successful in gaining support for this stance among national associations of more general economic purpose, organizations such as the National Association of Manufacturers, the Chamber of Commerce of the United

States and the American Farm Bureau Federation.

Considering the diversity of their institutional objectives and stakes in political contests to decide the outcomes of public land issues, economic and non-economic groups severally perform remarkably similar roles. Functioning as advocates for specific organizational goals, national interest group participants in land resource policy-making act as originators of new proposals to modify existing resource allocations, as coalition and alliance builders among organizations with compatible needs, and as bargainers with competing groups and with officeholders in the Executive Branch and Congress. Obviously, private groups might not perform all these roles in the same decision-making situation, nor do all occupy equally advantageous positions for the performance of each role in different policy contests.

LOBBY-SPONSORED LEGISLATION

As originators of ideas for statutory change in public land administration, organized resource users are probably even more prolific than the federal managers. Certainly interest groups are less constrained in their drafting efforts in that they need not endure the delays and reverses of formal legislative clearance in the Executive Branch. This is not to suggest that all interest group bills submitted to Congress are favorably acted upon or even seriously considered. Most are given the courtesy of an introduction by a friendly congressman and then pigeonholed. Of course the same may be said of many executive proposals for new legislation, but the percentage of successes by federal bureaus is much higher than that of their client groups. Nonetheless, private associations have originated proposals that were later elevated as important public lands issues by congressional committees, and some were enacted as law.

After World War II, livestock and wool growing organizations offered a series of grazing bills which were successively initiated for congressional consideration by the Committees on Agriculture and on Interior and Insular Affairs. All but one of these bills

were defeated by the concerted opposition of conservationists, the Forest Service, and members within the congressional committees themselves. The single exception, the Granger-Thye Act of 1950, succeeded to passage after extensive alterations were imposed on the original draft.

While grazing disputes were still in progress, a similar effort to change national forest administration was made by conservation and outdoors associations. Congressional hearings were held in both House and Senate on proposals initiated by conservationists to earmark forest receipts—moneys from timber sales and grazing fees—for construction of recreation facilities. None of these bills was successful, but the concept of a special fund for recreation, land acquisition and development was later sponsored by the Outdoor Recreation Resource Review Commission and by President John F. Kennedy. This type of fund became the prime feature of the Land and Water Conservation Act of 1964. Of all public lands bills originated by national interest groups since 1950, the wilderness preservation bill was unquestionably the most significant in terms of the intergroup conflict it generated, its eventual success, and its lasting aftereffects. Drafted by the Wilderness Society in 1956 and supported by a coalition of conservation and recreation organizations, the bill was finally passed in 1964.

It should be stressed that interest-group drafts of new statutory provisions have very little chance of precipitating issue contests unless they are singled out for sponsorship by the chairman or ranking member of a jurisdictionally relevant congressional committee, or unless they are supported by Executive Branch participants and approved in the legislative clearance process. Neither is likely unless the originating group can demonstrate the agreement of other specialized interests on behalf of its proposals, or better yet, can show widespread popular support for the measure. Both possibilities place a premium on the consummation of strong and articulate coalitions, lending impetus to congressional or executive elevation of an issue

and promoting an effective legislative campaign. The same may be said of groups wishing to maintain a status quo position so that claims pressed by coalitions attempting to change the existing allocation of resources may be halted or at least modified.

Loose intergroup coalitions are most commonly formed to initiate or respond to an emergent issue for the duration of one legislative contest. Others are formally maintained on a more permanent basis. The Citizens Committee on Natural Resources is such an alliance, which has long been active among conservation groups. It operates as an information and communications center for its members, undertaking independent lobbying activities as well. Similarly, several of the national timber production associations maintain a formal alliance known as the Forest Industries Council. The Council is directed by a board consisting of the presidents and executive secretaries of the American Pulpwood Association, the American Paper Institute, and the National Forest Products Association. This board meets frequently to consider what positions should be adopted and actions taken on pending or anticipated policy-making situations or disputes. Both these formal coalitions frequently send representatives to appear at congressional hearings and at other legislative bargaining sessions. Each has full-time staff representatives in Washington. These alliances are also active in efforts to muster coalition unity and support during periods of intense controversy over the interests of their members.

In competitive situations, allied groups confronted with the prospect of statutory changes viewed as detrimental to their members typically act as bargainers on behalf of amendments to modify or eliminate the adverse effects of such measures. The medium of exchange in transactions arrived at is most generally a pledge of support for the amended bill by the bargaining coalition, or at least a reduction of that coalition's efforts to defeat the bill outright. Such bargains are not normally consummated as formal agreements. Nor are coalesced groups sponsoring or sup-

porting the resource allocation changes at stake in positions to deal with their opponents directly. Rather, bargains introducing alterations in proposed legislation are negotiated by intermediaries in positions of governmental authority—federal land managing agencies and departments, Budget Bureau officials, and senior members of the congressional committees on Agriculture or Interior—each performing roles as mediators or interest brokers.

POLICY PROCESSES

Students of natural resource politics frequently view policy outcomes in this field as the self-interested pronouncements of cozy elites, each involving a federal executive agency, congressmen and senators on a particular committee or subcommittee, a private association, and a relatively homogeneous local constituency. These "subsystems" or "subgovernments" are understood to hold a near monopoly on policy within the carefully circumscribed jurisdiction of each.⁹ Material conflicts between private interests are thus said to be avoided, indeed, excluded. In describing this "most important political reality" of land and water politics, Professor Grant McConnell reports:

Where dramatic conflicts over policy have occurred, they have appeared as rivalries among public administrative agencies, but the conflicts are more conspicuous and less important than the agreements among these systems. The most frequent solution to conflict is jurisdictional demarcation and establishment of spheres of influence. Logrolling, rather than compromise, is the normal pattern of relationship.

The success of logrolling and settlement by jurisdictional demarcation depends heavily on

⁹ See especially Douglass Cater, *Power in Washington* (New York: Random House, 1964); J. Leiper Freeman, *The Political Process: Executive Bureau-Legislative Committee Relations*, rev. ed. (New York: Random House, 1965); Arthur A. Maass, *Muddy Waters* (Cambridge: Harvard University Press, 1951).

¹⁰ Grant McConnell, *Private Power and American Democracy* (New York: Alfred A. Knopf, 1967), p. 244.

¹¹ Theodore J. Lowi, "American Business, Public Policy, Case Studies, and Political Theory," *World Politics*, XVI (July, 1964), 690.

¹² *Ibid.*, p. 690.

the exclusion of substantial parts of the population and of important interests and values from all these systems. . . .¹⁰

Political scientist Theodore J. Lowi carries the analysis further to suggest that

most contemporary public land and resource policies . . . are characterized by the ease with which they can be disaggregated and dispensed unit by small unit, each unit more or less in isolation from other units and from any general rule.¹¹

In a word, these policies and the processes which offer them are "distributive" in character:

These are policies that are virtually not policies at all but are highly individualized decisions that only by accumulation can be called a policy. They are policies in which the indulged and the deprived, the loser and the recipient, need never come into direct confrontation.¹²

Understandably, such a policy-making process is made possible by a political "pork barrel" filled with "unrelated items." What's more, the barrel is presumed to be infinitely large.

No doubt public land policy of the nineteenth century was arrived at in much the manner described by these analysts—add to the mix a healthy dose of incompetence and corruption. Just as certainly the "distributive" politics of public land resources continued well into this century. Some public lands decisions continue to be made according to this model but overwhelmingly public resource use is now determined in a process regularly referred to as "pluralism." It is not that the "subsystems" or "subgovernments" have atrophied. On the contrary, they have been expanded to include additional federal bureaus, congressional committees and subcommittees, additional and contentious national interest groups, the communications media in its various forms, and an increasingly heterogeneous collection of

(Continued on page 52)

Robert S. Gilmour is a specialist in interest-group pressures on the legislative process. He recently completed a book on legislative policy making for natural resources under a grant from Resources for the Future, Inc.

BOOK REVIEWS

SUGGESTED READINGS ON THE ENVIRONMENT, PART II

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Editorial Assistant, Current History

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ON THE ENVIRONMENT

PROTECTING OUR ENVIRONMENT.
EDITED BY GRANT S. McCLELLAN. (New York: H. W. Wilson, 1970. 210 pages and bibliography, \$4.00.)

This volume of The Reference Shelf series is particularly useful to students de-
(Continued on page 52)

CURRENT DOCUMENTS

National Environmental Policy Act

On January 1, 1970, President Richard Nixon signed into law a bill which establishes as national policy the encouragement of environmental protection and the preservation of our natural resources. The Act follows:

AN ACT

To establish a national policy for the environment, to provide for the establishment of a Council on Environmental Quality, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Environmental Policy Act of 1969."

PURPOSE

SEC. 2. The purposes of this Act are: To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

TITLE I

DECLARATION OF NATIONAL ENVIRONMENTAL POLICY

SEC. 101. (a) The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

(b) In order to carry out the policy set forth in this Act, it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may—

(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;

(2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;

(3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;

(4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

(5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and

(6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(c) The Congress recognizes that each person should enjoy a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.

SEC. 102. The Congress authorizes and directs that, to the fullest extent possible: (1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act, and (2) all agencies of the Federal Government shall—

(A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making which may have an impact on man's environment;

(B) identify and develop methods and pro-

cedures, in consultation with the Council on Environmental Quality established by title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;

(C) include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on—

(i) the environmental impact of the proposed action;

(ii) any adverse environmental effects which cannot be avoided should the proposal be implemented;

(iii) alternatives to the proposed action;

(iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity and;

(v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Prior to making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statement and the comments and views of the appropriate Federal, State, and local agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality and to the public as provided by section 552 of title 5, United States Code, and shall accompany the proposal through the existing agency review processes;

(D) study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources;

(E) recognize the worldwide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment;

(F) make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment;

(G) initiate and utilize ecological information in the planning and development of resource-oriented projects; and

(H) assist the Council on Environmental Quality established by title II of this Act.

SEC. 103. All agencies of the Federal Govern-

ment shall review their present statutory authority, administrative regulations, and current policies and procedures for the purpose of determining whether there are any deficiencies or inconsistencies therein which prohibit full compliance with the purposes and provisions of this Act and shall propose to the President not later than July 1, 1971, such measures as may be necessary to bring their authority and policies into conformity with the intent, purposes, and procedures set forth in this Act.

SEC. 104. Nothing in Section 102 or 103 shall in any way affect the specific statutory obligations of any Federal agency (1) to comply with criteria or standards of environmental quality, (2) to coordinate or consult with any other Federal or State agency, or (3) to act, or refrain from acting contingent upon the recommendations or certification of any other Federal or State agency.

SEC. 105. The policies and goals set forth in this Act are supplementary to those set forth in existing authorizations of Federal agencies.

TITLE II

COUNCIL ON ENVIRONMENTAL QUALITY

SEC. 201. The President shall transmit to the Congress annually beginning July 1, 1970, an Environmental Quality Report (hereinafter referred to as the "report") which shall set forth (1) the status and condition of the major natural, man-made, or altered environmental classes of the Nation, including, but not limited to, the air, the aquatic, including marine, estuarine, and fresh water, and the terrestrial environment, including, but not limited to, the forest, dryland, wetland, range, urban, suburban, and rural environment; (2) current and foreseeable trends in the quality, management and utilization of such environments and the effects of those trends on the social, economic, and other requirements of the Nation; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the Nation in the light of expected population pressures; (4) a review of the programs and activities (including regulatory activities) of the Federal Government, the State and local governments, and nongovernmental entities or individuals, with particular reference to their effect on the environment and on the conservation, development and utilization of natural resources; and (5) a program for remedying the deficiencies of existing programs and activities, together with recommendations for legislation.

SEC. 202. There is created in the Executive Office of the President a Council on Environmental Quality (hereinafter referred to as the "Council"). The Council shall be composed of three members who shall be appointed by the President to serve

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Environmental Protection Act of 1970

On March 19, 1970, Senator George McGovern (D., S. Dak.) and Senator Philip Hart (D., Mich.) introduced S.3575 in the Senate. The bill, which provides that citizens may bring suit to protect the environment, follows:

S. 3575

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Environmental Protection Act of 1970."

SEC. 2. (a) The Congress finds and declares that each person is entitled by right to the protection, preservation, and enhancement of the air, water, land, and public trust of the United States and that each person has the responsibility to contribute to the protection and enhancement thereof.

(b) The Congress further finds and declares that it is in the public interest to provide each person with an adequate remedy to protect the air, water, land, and public trust of the United States from unreasonable pollution, impairment, or destruction.

(c) The Congress further finds and declares that hazards to the air, water, land, and public trust of the United States are caused largely by persons who are engaged in interstate commerce, or in activities which affect interstate commerce.

SEC. 3. (a) Any person may maintain an action for declaratory or equitable relief in his own behalf or in behalf of a class of persons similarly situated, for the protection of the air, water, land, or public trust of the United States from unreasonable pollution, impairment, or destruction which results from or reasonably may result from any activity which affects interstate commerce, wherever such activity and such action for relief constitute a case or controversy. Such action may be maintained against any person engaged in such activity and may be brought, without regard to the amount in controversy, in the district court of the United States for any judicial district in which the defendant resides, transacts business or may be found: *Provided*, That nothing herein shall be construed to prevent or preempt State courts from exercising jurisdiction in such action. Any complaint in any such action shall be supported by affidavits of not less than two technically qualified persons stating that to the best of their knowledge the activity which is the subject of the action damages or reasonably may damage the air, water, land, or public trust of the United States by pollution, impairment, or destruction.

(b) For the purpose of this section, the term "person" means any individual or organization; or any department, agency, or instrumentality of the United States, a State or local government, the Dis-

trict of Columbia, the Commonwealth of Puerto Rico, or a possession of the United States.

SEC. 4. (a) When the plaintiff has made a *prima facie* showing that the activity of the defendant affecting interstate commerce has resulted in or reasonably may result in unreasonable pollution, impairment, or destruction of the air, water, land, or public trust of the United States the defendant shall have the burden of establishing that there is no feasible and prudent alternative and that the activity at issue is consistent with and reasonably required for promotion of the public health, safety, and welfare in light of the paramount concern of the United States for the protection of its air, water, land, and public trust from unreasonable pollution, impairment or destruction.

(b) The court may appoint a master to take testimony and make a report to the court in the action.

(c) The court or master, as well as the parties to the action, may subpoena expert witnesses and require the production of records, documents, and all other information necessary to a just disposition of the case.

(d) Costs may be apportioned to the parties if the interests of justice require.

(e) No bond shall be required by the court of the plaintiff: *Provided*, That the court may, upon clear and convincing evidence offered by the defendant that the relief required will result in irreparable damage to the defendant, impose a requirement for security to cover the costs and damages as may be incurred by defendant when relief is wrongfully granted: *Provided further*, That such security shall not be required of plaintiff if the requirement thereof would unreasonably hinder plaintiff in the maintenance of his action or would tend unreasonably to prevent a full and fair hearing on the activities complained of.

SEC. 5. The court may grant declaratory relief, temporary and permanent equitable relief, or may impose conditions on the defendant which are required to protect the air, water, land, or public trust of the United States from the pollution, impairment, or destruction.

SEC. 6. This Act shall be supplementary to existing administrative and regulatory procedures provided by law and in any action maintained under the Act, the court may remand the parties to such

(Continued on page 54)

OUR ECOLOGICAL CRISIS

(Continued from page 12)

wise become more concerned with what is meaningful, relevant and holistic, and become less concerned with interest groups (including what teachers happen to know), physical plant and symbols of quantitative "educational achievement."

Both the political and economic systems can be reformed, but, like the three other areas of reform just mentioned, they are unlikely to move along the right path unless the general cognitive outlook of our society is changed—changed by a clear-sighted recognition of the true nature of man and his relationship to the universe of nature, and of the values and assumptions which will make it possible to satisfy his real animal needs, and to develop those social, emotional and intellectual needs which make him something more than an animal.

AIR POLLUTION

(Continued from page 22)

its generating plants on schedule to meet the demand for electric power that doubles every ten years.

There are encouraging signs. The airline industry, for example, has agreed to a voluntary program of refitting the bulk of aircraft engines to cut down the amount of pollution. Aircraft only account for about one per cent of the total air pollution picture, but it is a highly visible one per cent. Besides, the industry is well aware that if it does not act on a voluntary basis, it will face a law forcing compliance. In fact, the industry may face legislation anyway. And industry in general is much more aware of environment today. There is hardly a major company today that is not considering pollution-control equipment for new plants—and for old.

*** Ed. note:* See also the article by Marshall Goldman, "Costs of Fighting Pollution," *Current History*, August, 1970.

COSTS OF ABATEMENT

A big question mark now is cost.** There are no reliable figures on what air pollution abatement means to the pocketbook of either industry or government. One reason is that there will be a growing trend to stop air pollution before it reaches the smokestack. This will mean changes in processes for industry so that what goes up the smokestack contains no pollutants. It also means a change in fuels for some industries. In some cities and states there are already regulations that limit the sulfur content of the fuel that can be burned. However, the available supply of low sulfur fuel is scarce, and the supply that is available is expensive.

H.E.W. did develop some cost figures, which were published in the spring of 1970. They show that between 1970 and 1975, federal, state and local governments are expected to spend \$1.7 billion for air pollution control. This figure includes \$638 million for research and development and \$1 billion for abatement and control of air pollution. The bulk of the money will be spent by the federal government.

CONFLICTING PRESSURES

But local and state governments will be faced with an increasing pressure to control pollution, and continued pressure from industry to go slow. As President Nixon said in his environmental message:

Increasingly, industry itself has been adopting ambitious pollution-control programs, and state and local authorities have been setting and enforcing stricter anti-pollution standards. But they have not gone far enough or fast enough, nor, to be realistic about it, will they be able to without the strongest possible federal backing. Without effective government standards, industrial firms that spend the necessary money for pollution control may find themselves at a serious economic disadvantage as against their less conscientious competitors. And without effective federal standards, states and communities that require such controls find themselves at a similar disadvantage in attracting industry, against more permissive rivals. Air is no respecter of political boundaries; a community that sets and enforces strict standards may still find it is polluted from sources in another community or another state.

SOLID WASTES AND LAND POLLUTION

(Continued from page 17)

economic resources of the nation at large.

Proposals are being made to levy a tax on containers, graduated according to the difficulty of recycling. It is expected that this will encourage manufacturers to use materials and construction which would be reused, returned or recycled, or would be degradable if discarded into the environment. Soon the conventional economic mechanisms of the marketplace will not be adequate in determining which products may prove successful; the era of design by intuition may be passing. New products will be marketed only after their full social, ecological and technological impacts are thoroughly evaluated.

Resolution of the solid wastes problem will require radical change in patterns of consumption and disposal, major shifts in municipal administration, and a national change in attitude toward the environment. It will also take time and money.

H.E.W. estimates that \$560 million per year will be required to upgrade our garbage collection systems; another \$230 million per year is required to eliminate the open dumps now in use and to improve the level of sanitary landfill operations. Another \$45 million per year for five years will be required to provide adequate incinerator capacity. The price tag comes to \$835 million per year for five years to upgrade existing collection and disposal practices in this country to a satisfactory level. This means our national garbage pile costs us about \$5.4 billion a year, to which must be added four per cent to six per cent each year to allow for costs due to population growth and increased per capita generation of solid wastes, and this does not count inflation tolls, now averaging about six per cent. Thus we have an annual \$6-billion problem just to stay even with our national garbage. How much more it will cost to put reuse and recycling concepts into practice is unknown.

The momentum of change today is so rapid

that more intensive planning is needed to avoid accumulating problems. President Nixon stated recently:

We can no longer afford to approach the long-range future haphazardly. As the pace of change accelerates, the process of change becomes more complex, yet at the same time an extraordinary array of tools and techniques has been developed by which it becomes increasingly possible to project future trends—and thus make the kind of informed choices which are necessary if we are to establish mastery of the process of change.

Urging a closer link between sophisticated forecasting and decision-making, he stated further:

We have reached a state of technological and social development at which the future nature of our society can increasingly be shaped by our own conscious choices.

The prospects for improving the quality of the environment can be bright if we revise our values, adjust priorities, and set realistic goals. It should be kept in mind that even the most modest goals will mean sacrifices in money, conveniences and personal freedom; tougher standards and enforcement; higher taxes and consumer prices. Even modest goals will force us to consider Gross National Pollution along with the Gross National Product. Lastly, they will require patience, because significant results will not be evident for many years.

WATER POLLUTION

(Continued from page 30)

against the Trans Alaskan Pipeline System all suggest that considerable change in the rules of the game is being accomplished through legal and judicial avenues.

Also growing are foundation-supported legal centers which offer a measure of public interest representation to counter the legal and financial resources of private interests. These institutionalized "Ralph Naders" function as environmental ombudsmen to prevent piecemeal decisions, whether on sale of parcels of wetlands, oil drilling leases or pesticide

States with Approved Water Quality Standards - 1968.



Reprinted from *The Nation's Water Resources* (Washington, D.C.: U.S. Water Resources Council, 1968), p. 5-3-2.

use, being made with insufficient consideration of environmental effects.

There also should be increased international collaboration, as symbolized by the forthcoming United Nations conference on the human environment. When DDT in high concentrations is detected in arctic polar bears, all countries begin to realize the need for scientific cooperation to control the contamination on our polluted planet.

Finally, on the ideological plane, we are witnessing the gradual acceptance of an ecological conscience and a developing feeling of public and governmental responsibility for our environmental well-being and for the long-range consequences of our technological actions. This ethic values a liveable environment over economic expansion, and so we are beginning to pause before embarking on projects that are advanced in the name of progress and modernization and are justified solely on the basis of immediate economic benefits. In this quest for environmental quality, we may eventually value

Z.P.G. (zero population growth) over G.N.P. (gross national product).

Such a scheme of values will affect and restrict our traditional free-enterprise system. Recognizing that we can expect a Santa Barbara-scale incident once a year by 1980 if offshore oil development continues at the present uncontrolled rate, we may decide to declare a moratorium on such undersea oil exploration and production in the name of a higher environmental good.

Thus government will take an increasingly larger role in private decision-making when environmental considerations are involved. Direct or indirect government intervention in industrial design and process controls and even in site location is almost inevitable if the government is to make good on its commitment to environmental quality. Similarly, the screening of new products may be undertaken for their environmental effects before manufacturers introduce them on the market in the same manner that the Food and Drug Administration now scrutinizes

drugs before they are given to the public.

We have reached an awareness of the seriousness of our water pollution and other environmental problems but our political structures are still not keeping up with changes in the biophysical environment. The challenge of the 1970's will be to confront the difficult policy problems of institutional arrangements and to establish effective systems not only for the control of water pollution but also for the enhancement of our irreplaceable water resources.

PRIVATE INTERESTS AND PUBLIC LANDS

(Continued from page 42)

state and local actors—political executives, agencies and private groups.

Political pluralism is characterized by competition among interest groups and other actors for the same stakes or resources, bargaining among these parties to each decision, and compromised outcomes offering a middle ground solution that "satisfies everyone a little bit but no one entirely." Carried on within the structural frameworks offered by legislative and administrative procedures, this was precisely the kind of process that could be observed in nearly all major—and minor—public lands decisions of the past two decades. Just to name a few, the Granger-Thye Grazing Act of 1950, the Multiple-Use Mining Act (1955), the Multiple-Use and Sustained-Yield Act (1960), the Wilderness Preservation Act (1964), the Land and Water Conservation Act (1964), and the Wild and Scenic Rivers Act of 1968 were all the much compromised results of pluralist politics. During the same period, defeats of the Echo Park and Ramparts Dams and cancellation of the South Florida Jetport adjacent to the Everglades National Park were rather clearly the results of formerly "distributive" arenas turned highly competitive.

As the prevailing nineteenth century fiction of superabundant resources gives way to the reality of scarcity and over-capacity demand in the twentieth century, as commercial

organizations and conservationists gain greater capacity for political action, and as the interconnectedness of all natural resources is more widely understood, it is to be expected that public lands policy-making will entail even greater involvement of private groups and more intense conflict. It also seems likely that the "individualized decisions" of the past may be reaggregated in omnibus packages now common to several policy areas.

POLLUTION AND A CONCERNED PUBLIC

(Continued from page 35)

The goal is obvious: We must stop being a nation of conspicuous consumers and become a nation of conscientious conservers. We must spurn non-returnable bottles, demand biodegradable packaging, buy those products with the longest life expectancy, drive cars of reasonable size that do not spew tons of unnecessary pollutants into the air, and refuse to use detergents that will go from cleaning our homes to soiling our environment.

We have just begun to realize what we as individuals can do. We must not pass the buck. We must act on the fact that our security is again threatened—not from the outside, but from the inside—not by our enemies, but by ourselves. As Pogo quaintly puts it, "We have met the enemy and they is us."

BOOK REVIEWS

(Continued from page 45)

bating the N.U.E.A. topic of the environment. These excerpts from newspapers and magazines cover a wide range of subjects—air, water and noise pollution, costs of correction, considerations of various abatement techniques—by a number of eloquent and competent writers.

TECHNOLOGY AND GROWTH: THE PRICE WE PAY. By E. J. MISHAN.

(New York: Praeger Publishers, 1970. 165 pages and appendices, \$7.50.)

Mishan is an outspoken economist. He takes issue with the sacred cows of the past decades, questioning our "growthmania" and deplored the effect of the automobile on urban life.

While Mishan writes from the vantage point of an Englishman, his strictures on our growing dependence on the machine apply to all advanced countries. O.E.S.

THE CONSERVATION FRAUD. By CHARLES ZURHORST. (New York: Cowles Book Co., 1970. 123 pages and appendices, \$4.95.)

Despite the title, this is not an anticonservation book. Zurhorst depicts the conflicts among conservation groups and shows that the legislation now on the books is not protecting the environment.

The author urges a national approach to conservation. He sees progress in "salvation through the courts" and details the work of the American Trial Lawyers Association.

O.E.S.

THE HUNGRY FUTURE. By Rene Dumont and Bernard Rosier. (New York: Frederick A. Praeger, Inc., 1969, 271 pages, bibliography and index, \$6.95.)

The authors, specialists in agronomy, analyze in depth the worldwide scope and breadth of looming starvation. The immediacy of the problem is stressed, but the authors conclude that all is not lost if massive global action on all fronts—population control, agricultural reform and technology—is undertaken at once. The careful outline of the problems of the various geographical and cultural areas of the world, plus the authors' suggested remedies, should prove useful to the student of environment and conservation.

J.H.

LIFE AND DEATH OF THE SALT MARSH. By John and Mildred Teal. Illustrated by Richard G. Fish. (Boston:

Little, Brown and Company, 1969, 278 pages and index, \$7.95.)

This book traces the evolution of the salt marshes that edge the east coast of the United States, the life that they shelter, their contributions to man, and their pollution and destruction. The authors conclude with suggestions for saving the marshes. The handsome line drawings by Richard Fish are a valuable contribution to this book.

J.H.

AMERICA THE RAPED: THE ENGINEERING MENTALITY AND THE DEVASTATION OF A CONTINENT. By Gene Marine. (New York: Simon and Schuster, 1969, 312 pages, notes and indexes, \$5.95.)

This book is written more for the mass public than for the serious student of ecology and conservation; the examples of devastation and pollution which are cited are described in dramatic rather than scientific terms; the writing style is that of a reporter (which Marine is), rather than that of a scientist or sociologist.

The villain, as described by Marine, is the "engineer" who is accused of dividing the land into "useful and useless," finding simple solutions to problems and ignoring the side effects of those solutions.

J.H.

ERRATUM: We regret that an error appeared in the last paragraph on page 284, column one of our May, 1970, issue, in Pellegrino Nazzaro's article, "Italy in Europe." The date of the general election should read May 19, 1968.

NATIONAL ENVIRONMENTAL POLICY ACT

(Continued from page 47)

at his pleasure, by and with the advice and consent of the Senate. The President shall designate one of the members of the Council to serve as Chairman. Each member shall be a person who, as a result of his training, experience, and attainments, is exceptionally well qualified to analyze and interpret environmental trends and information of all kinds: to appraise programs and activities of the Federal Government in the light of the policy set forth in title I of this Act; to be conscious of and responsive to the scientific, eco-

nomic, social, esthetic, and cultural needs and interests of the Nation; and to formulate and recommend national policies to promote the improvement of the quality of the environment.

SEC. 203. The Council may employ such officers and employees as may be necessary to carry out its functions under this Act. In addition, the Council may employ and fix the compensation of such experts and consultants as may be necessary for the carrying out of its functions under this Act, in accordance with section 3109 of title 5, United States Code (but without regard to the last sentence thereof).

SEC. 204. It shall be the duty and function of the Council—

(1) to assist and advise the President in the preparation of the Environmental Quality Report required by section 201;

(2) to gather timely and authoritative information concerning the conditions and trends in the quality of the environment both current and prospective, to analyze and interpret such information for the purpose of determining whether such conditions and trends are interfering, or are likely to interfere, with the achievement of the policy set forth in title I of this Act, and to compile and submit to the President studies relating to such conditions and trends;

(3) to review and appraise the various programs and activities of the Federal Government in the light of the policy set forth in title I of this Act for the purpose of determining the extent to which such programs and activities are contributing to the achievement of such policy, and to make recommendations to the President with respect thereto;

(4) to develop and recommend to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation;

(5) to conduct investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality;

(6) to document and define changes in the natural environment, including the plant and animal systems, and to accumulate necessary data and other information for a continuing analysis of these changes or trends and an interpretation of their underlying causes;

(7) to report at least once each year to the President on the state and condition of the environment; and

(8) to make and furnish such studies, reports thereon, and recommendations with respect to matters of policy and legislation as the President may request.

SEC. 205. In exercising its powers, functions, and duties under this Act, the Council shall—

(1) consult with the Citizens' Advisory Committee on Environmental Quality established by Executive Order numbered 11472, dated May 29, 1969, and with such representatives of science, industry, agriculture, labor, conservation organizations, State and local governments and other groups, as it deems advisable; and

(2) utilize, to the fullest extent possible, the services, facilities, and information (including statistical information) of public and private agencies and organizations, and individuals, in order that duplication of effort and expense may be avoided, thus assuring that the Council's activities will not unnecessarily overlap or conflict with similar activities authorized by law and performed by established agencies.

SEC. 206. Members of the Council shall serve full time and the Chairman of the Council shall be compensated at the rate provided for Level II of the Executive Schedule Pay Rates (5 U.S.C. 5313). The other members of the Council shall be compensated at the rate provided for Level IV or the Executive Schedule Pay Rates (5 U.S.C. 5315).

SEC. 207. There are authorized to be appropriated to carry out the provisions of this Act not to exceed \$300,000 for fiscal year 1970, \$700,000 for fiscal year 1971, and \$1,000,000 for each fiscal year thereafter.

Approved January 1, 1970.

ENVIRONMENTAL PROTECTION ACT

(Continued from page 48)

procedures: *Provided*, That nothing in this section shall be deemed to prevent the granting of interim equitable relief where required and so long as is necessary to protect the rights recognized herein: *Provided further*, That any person entitled to maintain an action under this Act may intervene as a part in all such procedures: *Provided further*, That nothing herein shall be deemed to prevent the maintenance of an action, as provided in this Act, to protect the rights recognized herein, where existing administrative and regulatory procedures are found by the court to be inadequate for the protection of such rights: *Provided further*, That, at the initiation of any person entitled to maintain an action under the Act, such procedures shall be reviewable in a court of competent jurisdiction to the extent necessary to protect the rights recognized herein; and *provided further*, That in any such judicial review the court shall be bound by the provisions, standards, and procedures or sections 3, 4, and 5 of this Act, and may order that additional evidence be taken with respect to the environmental issues involved.

The Month In Review

A CURRENT HISTORY chronology covering the most important events of May, 1970, to provide a day-by-day summary of world affairs.

INTERNATIONAL

Asian Foreign Ministers Meeting

May 16—Delegates from Indonesia, Australia, New Zealand, Japan, South Korea, South Vietnam, Laos, Thailand, Malaysia, Singapore, the Philippines and Cambodia (as "special invitee"), in Jakarta to discuss the Cambodian situation, proclaim a new era of Asian responsibility for Asia's destiny.

May 17—The Asian foreign ministers, meeting in Jakarta, appeal to the participants of the 1954 Geneva Conference on Indochina to cooperate in ending the Cambodian conflict.

Disarmament

May 6—Continuing the Strategic Arms Limitation Talks (SALT), Soviet and United States delegates hold their sixth working session in Vienna.

European Economic Community (Common Market)

May 29—The foreign ministers of the European Common Market select Italian Communications Minister Franco Maria Malfatti as the new president.

Middle East Crisis

(See also *Intl. U.N.*)

May 2—Jordanian troops and guerrillas of the Palestine Armed Struggle Command engage in a 10-hour battle.

May 7—Lebanon faces retaliatory attacks from Israel if rocket attacks continue, according to a warning issued by Israeli Defense Minister Moshe Dayan.

May 9—Installation of Soviet SAM-3 missiles along the Suez Canal will not be permitted, and if Soviet planes interfere with Israeli attacks against Egyptian guns, they will also be attacked, Dayan announces.

May 12—In response to growing attacks on Israeli settlements, the Israeli army launches an armored force sweep of the Lebanese border area.

Al Fatah guerrillas, troops of the Lebanese army and Syrian fighter planes counter the Israeli attack on the Lebanese border.

May 13—U.S. military sources report in Washington that 100 Soviet pilots have arrived in the U.A.R. to man interceptor planes.

May 14—An Egyptian navy missile boat sinks an Israeli fishing vessel with a crew of 4 aboard.

May 16—Israeli planes sink an Egyptian destroyer and a missile boat in the Red Sea.

May 17—Israeli military sources announce that intensive Israeli air attacks have been aimed at halting or slowing the construction by the United Arab Republic of reinforced missile sites along the Suez Canal.

May 22—A school bus is ambushed in Israel near the Lebanese border; 11 are killed and 21 wounded. Most of the dead and wounded are children.

North Atlantic Treaty Organization (NATO)

May 27—Following a 2-day meeting in Rome, the 15 foreign ministers of the North Atlantic Treaty Organization issue a declaration and a communiqué which call for meetings with the Soviet Union, the Warsaw Pact powers and other interested governments on the mutual and balanced reduction of forces in Central Europe.

Organization For Economic Cooperation and Development (O.E.C.D.)

May 26—A review of the United States

economy prepared by the Organization for Economic Cooperation and Development, a 22-nation organization (of which the United States is a member), suggests that the U.S. adopt formal wage and price guidelines.

United Nations

(See also *Middle East Crisis, War in Indochina*)

May 5—U.N. Secretary General U Thant appeals for an international conference to restore peace in Indochina.

May 12—The Security Council votes unanimously to demand that Israel withdraw her forces from Lebanon.

May 14—Charles W. Yost, the U.S. representative, accuses the Soviet Union of exacerbating the tense Middle East situation by sending military personnel to the United Arab Republic to bolster Egyptian forces.

May 20—Charles W. Yost announces that the U.S. will actively discourage U.S. investments in South-West Africa as long as South Africa continues to rule the area in defiance of the U.N.

War in Indochina

(See also *Asian Foreign Ministers Meeting*)

May 1—5,000 U.S. infantrymen sweep into Cambodia in an attempt to locate and destroy the headquarters of Vietnamese Communist forces. 5,000 South Vietnamese soldiers accompany the U.S. troops. (See *U.S., Foreign Policy, Current History*, June, 1970, p. 377.)

Cambodian Premier Lon Nol says that he received no advance notice of the U.S. invasion of Cambodia.

May 2—Heavy bombing raids, suspended for the past 18 months, are resumed over North Vietnam by U.S. forces.

May 3—Widespread attacks against U.S. bases in South Vietnam are launched by the North Vietnamese.

Some 2,000 Cambodians who have been serving as mercenaries in U.S. units are sent to Cambodia to join the invasion.

A cache of rice, medical supplies and

some ammunition is found by U.S. troops searching Cambodian base areas.

May 5—A promise to get U.S. forces out of Cambodia in 3 to 7 weeks is voiced by U.S. President Richard Nixon. He also pledges not to send U.S. troops more than 21 miles into Cambodia.

The town of Snoul in Cambodia is destroyed by U.S. tank forces.

The U.S. Department of Defense reveals that it has bombed a fourth area in North Vietnam, but that large-scale bombing has ended.

May 6—North Vietnamese and Vietcong delegates to the Paris peace talks cancel the 66th session in protest against U.S. bombing of North Vietnam.

May 9—Navy ships, including 30 U.S. ships, begin a drive into Cambodia up the Mekong River.

May 11—Some allied ships reach the Cambodian capital of Phnompenh. They will pick up Vietnamese nationals and return them to Vietnam.

May 12—A blockade of the Cambodian coastline is begun by U.S. Navy vessels. The ships will intercept North Vietnamese supply boats.

May 13—Some 1,000 U.S. soldiers are withdrawn from Cambodia.

May 14—Philip C. Habib, the U.S. delegate to the Paris peace conference, informs the Vietnamese Communists that they have displayed "intransigence" at the conference table. He warns that the U.S. will act accordingly.

May 15—at a press conference in Washington, U.S. State Department officials indicate that the U.S. is encouraging South Vietnam and Cambodia to formulate a joint plan for the defense of the regime of Premier Lon Nol. Other administration sources indicate that the U.S. reserves the right to veto such plans if they jeopardize the conduct of the war.

May 17—Cambodian forces regain control of Kompong Cham, Cambodia's 2d largest city.

May 18—Cambodian sources report that on May 16, 1970, they asked an 11-nation

conference of Asian foreign ministers meeting in Jakarta, Indonesia, to send troops.

May 20—Some 2,500 South Vietnamese, supported by U.S. air power and advisers, begin a new attack in Cambodia 125 miles northeast of Saigon.

May 21—The U.S. command announces that the weekly toll of U.S. soldiers killed is 217. Of these 77 were killed in Cambodia, 140 in South Vietnam.

The 67th session of the peace talks takes place in Paris; no progress is reported.

May 22—A military spokesman of the government of South Vietnam announces that 2 new assaults into enemy sanctuaries have raised the number of South Vietnamese troops in Cambodia to 40,000.

The government of South Vietnam decides to halt the mass evacuation of Vietnamese refugees from Cambodia.

May 23—A rubber plantation which produced about half of Cambodia's output of rubber is seized by a South Vietnamese force searching for an enemy regiment.

May 27—Following a 3-day meeting in Saigon, the foreign ministers of South Vietnam and Cambodia release a communiqué stating that the South Vietnamese forces entered Cambodia by agreement with the Cambodian government and that the troops will leave when the task is completed.

President Nguyen Van Thieu of South Vietnam declares that South Vietnamese forces will continue to operate in Cambodia for an indefinite period after U.S. troops leave and that they will require continued U.S. logistical support.

West African Economic Community

May 23—It is reported in *The New York Times* that the presidents of 7 African nations, Ivory Coast, Niger, Mali, Upper Volta, Dahomey, Senegal and Mauritania, have signed a protocol agreeing to the creation of the West African Economic Community, to replace the West African Economic and Customs Union.

ALGERIA

May 30—It is reported from Algeria that in a joint communiqué this week, Algeria and Morocco have indicated their resolve to eject Spain from her remaining enclaves in North Africa.

ARGENTINA

May 23—The newspaper *Crónica* is closed by the political police and charged with falsely reporting the death of a student in clashes with police in Córdoba.

May 26—The publisher of *Crónica* announces that the government has lifted its ban.

May 29—About 4,000 demonstrating workers and students march through Córdoba.

May 30—A search is initiated for former provisional President Pedro Eugenio Aramburu who was kidnapped yesterday.

CAMBODIA

(See also *Intl. Indochina War; U.S.S.R.*)

May 5—in Peking, exiled former Chief of State Norodom Sihanouk announces the establishment of a government-in-exile.

CANADA

May 31—The government announces that the dollar will be allowed to "float freely" in the world market.

CENTRAL AFRICAN REPUBLIC

May 23—The Foreign Ministry announces that diplomatic relations have been established with Albania at the embassy level.

CEYLON

May 28—Prime Minister Dudley Senanayake resigns following yesterday's general election; a 3-party leftist coalition headed by Mrs. Sirimavo Bandaranaike captured at least 115 of the 151 seats.

CHINA, PEOPLE'S REPUBLIC OF (Communist)

(See also *U.S.S.R.*)

May 19—A dispatch from *Hsinhua*, the Chinese Communist press agency, reveals that the Peking government has canceled a meeting scheduled for May 20 in War-

saw between the envoys of the United States and Communist China. The meeting was canceled because of "the United States invasion of Cambodia and the expansion of the war in Indochina."

May 20—In a 700-word statement, Mao Tse-tung, Chairman of the Chinese Communist party, issues a call for world revolution against "United States imperialism."

May 23—An editorial relayed by *Hsinhua* declares that there will be no easing of the policy of keeping millions of intellectuals and officials laboring as peasants and factory workers.

COLOMBIA

May 14—The curfew imposed on April 21, 1970, after disturbances which followed the general election, is lifted.

CONGO (KINSHASA)

May 23—The Peoples Revolutionary Movement declares itself the only political authority in the nation and outlaws all other parties.

CUBA

May 13—In a communiqué published in the Communist party newspaper, *Granma*, Premier Fidel Castro says that he will hold the United States responsible for the lives of 11 fishermen who are being held somewhere outside the U.S. by the Miami-based anti-Castro organization Alpha 66.

May 16—Demonstrators protesting the capture of 11 fishermen have imprisoned a Swiss official and a Cuban night watchman in the former U.S. Embassy in Havana. Swiss diplomats have been representing U.S. interests in Cuba.

May 18—The anti-Castro organization Alpha 66 announces the release of the 11 hostage fishermen.

The Swiss official held captive in the former U.S. Embassy is released.

May 21—It is reported in *The New York Times* that on May 19, 1970, Premier Fidel Castro announced that Cuba will not attain her goal of 10 million tons of sugar this year.

May 22—The Havana radio reports that

Cuba has sent a sharp note to Switzerland in response to a note from Swiss Foreign Minister Pierre Graber protesting the Havana demonstrations over the fishermen hostages.

CZECHOSLOVAKIA

May 6—A new treaty of friendship is signed by Soviet and Czech leaders endorsing the Brezhnev doctrine which justified the Warsaw Pact invasion of Czechoslovakia in 1968.

DAHOMEY

May 2—A 5-month deadlock is resolved by agreement on the form of a new government to replace the regime of ousted President Emile-Derlin Zinsou. Former President Hubert Maga will head a 3-man presidential council.

DOMINICAN REPUBLIC

May 17—President Joaquin Balaguer is re-elected to a second 4-year term; the election returns indicate that the Dominican Republic will continue to have a conservative government backed by military and business interests.

FINLAND

May 14—After almost 2 months of negotiations, President Urho Kekkonen appoints a new coalition government, with Teuvo Aura, the Liberal Lord Mayor of Helsinki, as Premier.

FRANCE

May 15—The Ministry of Defense announces that France is beginning a new series of 8 nuclear tests, to last until August 15.

May 28—For the 2d day in a row, Maoist students riot in Paris; scores are wounded and 230 are arrested.

GERMANY, FEDERAL REPUBLIC OF (West)

May 21—The second meeting of West German Chancellor Willy Brandt and East German Premier Willi Stoph takes place in Kassel, West Germany. Street demonstrations mar the meeting at which Chancellor Brandt presents a 20-point proposal.

No agreement is reached by the heads of state, and no formal arrangements are made for future meetings.

INDONESIA

(See also *Intl, Asian Foreign Ministers Meeting*)

May 11—In a press interview at his home, Foreign Minister Adam Malik says that Indonesia will send troops abroad to fight the Communists if war spreads into Malaysia and Thailand.

ISRAEL

(See also *Intl, Middle East Crisis*)

May 11—Israel celebrates the 22d anniversary of her independence.

May 21—In a press conference at the Israeli Embassy in Washington, following 2 days of talks with U.S. officials, Foreign Minister Abba Eban expresses disappointment because he has not received a positive response to Israel's request for U.S. jets.

ITALY

May 21—A general strike is threatened by 3 major labor federations dissatisfied with government pledges, as strikes by government employees spread.

JAPAN

May 11—The Ministry of Trade and Industry reports that Japanese exports rose by more than \$244 million between April, 1969, and April, 1970. Imports in this period rose by more than \$60 million.

May 24—Okinawan leaders assail the U.S. decision to cancel plans to ship 13,000 tons of nerve gas and chemical weapons stored on Okinawa to Oregon.

KENYA

May 9—The national language of Kenya is to be Swahili, according to an order issued by the government last month and revealed today. After December 31, 1971, Swahili must be used on all occasions by all Kenyans.

KOREA, REPUBLIC OF (South)

May 11—A boycott begun in October, 1969,

by the opposition New Democratic party to protest the third-term candidacy of President Chung Hee Park ends as its members attend the opening session of a special session of the National Assembly.

May 19—The South Korean and Cambodian governments announce an agreement to resume official relations.

LAOS

May 9—North Vietnamese troops advance to within 18 miles of Luang Prabang, 130 miles north of Vientiane.

MALAWI

May 9—A government edict declares that store-owning Asians in Malawi must apply for new licenses by July 1, 1970, or lose the right to do business. The edict attempts to enlarge opportunities for Africans.

NIGERIA

May 2—Declaring the emergency of the Biafran famine to be over, the Nigerian Red Cross ends its relief activities.

PARAGUAY

May 4—Two Al Fatah guerrillas slay an Israeli embassy employee in Asuncion; a second Israeli is critically injured. The guerrillas are captured by police.

PORTUGAL

(See *Spain*)

May 31—U.S. Secretary of State William Rogers leaves Portugal after 2 days of high-level meetings.

RUMANIA

(See *U.S.S.R.*)

SOMALIA

May 7—All foreign banks and oil companies within the country are nationalized by the government. The government says that compensation will be paid.

SOUTH AFRICA

May 11—Students picket the University of Witwatersrand in protest against the law providing for indefinite detention of political prisoners.

Jaap Marais, deputy leader of the right-

wing Reconstituted Nationalist party that opposes the Nationalist party on the grounds that it is too liberal toward the blacks, goes on trial before the Supreme Court under the Official Secrets Acts.

May 15—South Africa is expelled from the International Olympic Committee for violating Rule One of the Olympic charter which prohibits discrimination on the grounds of "race, religion or political affiliation."

SPAIN

May 23—Premier Marcelo Caetano of Portugal concludes a 4-day visit to Spain by signing an agreement to extend the Iberian pact for another 10 years.

May 29—Following meetings of U.S. Secretary of State William Rogers with Generalissimo Francisco Franco and other high-level officials, "substantial progress" is reported on an agreement on U.S. bases in Spain.

THAILAND

May 21—In a news conference, Interior Minister Praphas Charusathien says that Thailand is ready to give military equipment and medical aid to Cambodia.

UGANDA

May 6—Six men receive life sentences on the charge of attempting to assassinate President Milton Obote in December, 1969. (See *Current History Annual 1970*, p. 62.)

U.S.S.R.

(See also *Intl, Middle East; Czechoslovakia*)

May 4—At the first news conference held by a Soviet head of state in nearly 10 years, Premier Aleksei Kosygin attacks the U.S. invasion of Cambodia as aggression.

May 15—An official report issued by *Tass*, the Soviet press agency, says that Walter Ulbricht, head of the East German Communist party, and other East German leaders are visiting Moscow.

May 18—An editorial in *Pravda*, the Communist party newspaper, criticizes Communist China for seeking to dominate Asia, failing to respond to calls for concerted

action in Indochina, and creating anti-Soviet attitudes at home.

May 19—Rumanian President Nicolae Ceaușescu and other Rumanian Communist party leaders leave Moscow following 2 days of talks with Leonid I. Brezhnev and other Soviet leaders about their differences on the Communist movement.

May 20—Premier Aleksei N. Kosygin says that the Soviet Union is extending extensive aid to the Arab countries.

May 25—*Izvestia*, the government newspaper, publishes the text of a statement delivered on May 24 in Phnompenh by Soviet Ambassador Sergei M. Kudryavtsev. The statement warns the Cambodians of a "long fratricidal war" unless U.S. and South Vietnamese forces are withdrawn.

May 28—Initial reactions in the Soviet press to NATO proposals for East-West talks on the reductions of forces in Central Europe are cool. (See *Intl, NATO*.)

U.A.R.

(See *Intl, Middle East Crisis*)

UNITED KINGDOM

May 18—Prime Minister Harold Wilson calls for a general election to be held on June 18, 1970.

May 22—The Cricket Council cancels its invitation to the all-white South African cricket team to tour England. The cancellation follows a meeting of council leaders with James Callaghan, the Home Secretary, who urged the cancellation, despite some British opposition.

UNITED STATES

Civil Rights

(See also *Demonstrations and Protests*)

May 2—School officials in South Carolina are told by officials in the Department of Health, Education and Welfare that they must observe the announced deadline for implementing school desegregation by the fall of 1970.

May 5—Superior Court Judge Ward J. Herbert in Essex County, N.J., awards \$500 to a Negro minister in compensation for the "psychological trauma" he suffered when

a landlord refused to rent an apartment to him.

May 8—Criminal charges against the 7 members of the Black Panthers who survived a shooting incident with Chicago police in December, 1969, are dropped because there is not sufficient proof that the defendants fired at the police. The police claim to have shot in self-defense.

May 11—After fires and looting break out in downtown Augusta, Georgia, Governor Lester Maddox orders the National Guard and state troopers to patrol the area. Protesters are demonstrating against the death by beating of a black youth in the local jail.

May 13—It is reported that six Negroes have been killed and 75 injured in the Augusta rioting May 11 and May 12.

Three members of Chicago's police force are demoted in an apparent aftereffect of the December 4, 1969, raid on a Black Panther group.

May 14—2 blacks are killed and nine are wounded by police gunfire at Jackson State College in Mississippi.

May 15—Autopsies show that the 6 blacks killed in Augusta were shot in the back.

A federal grand jury reports that to justify police violence on December 4, 1969, when 2 Black Panthers were killed and 4 were wounded in a shooting raid, Chicago police exaggerated the resistance of the Black Panthers.

The Department of Justice submits a brief in the U.S. District Court for the District of Columbia maintaining that segregated private schools recently established in the South should be permitted to retain their tax-exempt status.

May 18—Attorney General John N. Mitchell confers with the president of Jackson State College, where 2 black students were killed on May 14.

May 23—A 110-mile "march against repression" sponsored by the Southern Christian Leadership Conference ends in a rally of some 10,000 people in Atlanta, Georgia.

A U.S. District Court judge rules that Denver's school system must desegregate 15 minority schools by 1972 and institute

changes to stimulate desegregation at 2 other schools.

May 27—The U.S. Court of Appeals for the Fourth Circuit decides in a 4-to-2 ruling that it is not necessary that every school within a district be integrated in order to comply with the Supreme Court's demand for nonracial systems. The decision leaves standing the lower court's order for desegregation of junior and senior high schools, but orders a new plan for the integration of elementary schools.

Demonstrations and Unrest

(See also *Civil Rights*)

May 2—A call for a nation-wide student strike is issued at the close of demonstrations in New Haven in support of the Black Panthers. (See *U.S., Campus Unrest, Current History*, June, 1970, p. 374.)

May 3—National Guardsmen are called to patrol duty at Kent State University in Ohio after student demonstrators set fire to the R.O.T.C. building in protest against President Richard Nixon's decision to invade Cambodia.

May 4—Four students at Kent State University are killed by National Guardsmen who fired into a crowd of some thousand students at a rally on the Commons. President Nixon states that "when dissent turns to violence it invites tragedy."

May 6—More than 80 colleges are closed in protest over the shootings at Kent State.

California Governor Ronald Reagan closes all 28 campuses of the University of California and state colleges for 4 days in the wake of spreading campus disorder. He asks California's private colleges to close also.

May 7—President Nixon confers with 8 university presidents in an attempt to quiet campus protests. (See also *Government*.)

May 8—President Nixon declares that he shares the aims of student protesters. The administration agrees that an antiwar rally may be held just south of the White House tomorrow.

Hard-hatted construction workers attack antiwar demonstrators in Wall Street in

New York City; some 70 demonstrators are injured.

May 9—The President surprises student protesters by paying them an informal pre-dawn visit at the Lincoln Memorial, where students are gathering for an antiwar rally. Later, some 75,000-100,000 people in Washington demonstrate against the war.

May 11—It is reported by *The New York Times* that at 158 institutions students are still on strike; many other colleges and universities reopen. Students, faculty and some administration officials visit their congressmen to protest administration policy.

May 15—Ohio University closes as armed National Guards move onto the campus.

May 16—In New York, some 10,000 people celebrating Armed Forces Day march to publicize support for the President.

May 20—The largest construction workers rally since May 8 is held opposite City Hall in New York. The helmeted workers, joined by longshoremen, have held almost daily rallies favoring the war and opposing the antiwar sentiments of Mayor John Lindsay.

Fifteen presidents of predominantly black universities and colleges tell the President that his policies have outraged the nation's Negroes.

May 21—Armed National Guards cordon off the campus of Ohio State University; episodes of interracial violence erupted yesterday. A student strike ended May 19.

Economy

(See also *Government*)

May 7—General unemployment figures for the nation's labor force in April reach 4.8 per cent. The average for all of 1969 was 3.5 per cent, according to government officials.

May 25—Security markets register the sharpest single-day decline since the assassination of President John F. Kennedy on November 22, 1963.

May 27—The Interstate Commerce Commission approves a freight-rate increase of 5 per cent while the agency is investigating a requested rate increase of 6 per cent.

Prices on the New York Stock Exchange show the largest 1-day advance ever recorded; it follows one of the deepest slumps in market history.

Foreign Policy

(See also *Demonstrations and Unrest, Government*)

May 4—The Senate Foreign Relations Committee charges that the administration has usurped the powers of Congress by sending U.S. troops into Cambodia without the consent or knowledge of Congress.

May 6—State Department spokesman Robert McCloskey says that the Soviet explanation for the presence of Russian pilots on combat missions for the U.A.R. is "unsatisfactory"; it is reported that the U.S. is reconsidering the sale of additional aircraft to Israel. (See also *Intl, Middle East*.)

Melvin Laird, Secretary of Defense, declares that he "supported fully" the President's decision to send U.S. ground troops into action in Cambodia.

May 8—It is reported that some 250 employees of the State Department and the U.S. foreign aid program have signed a letter to Secretary of State William P. Rogers opposing the U.S. military involvement in Cambodia.

In a televised news conference, the President declares that the U.S. drive into Cambodia will shorten the war; he promises that U.S. ground troops will be withdrawn by the end of June and says he shares the student protesters' peace goals.

May 11—The President talks to 45 state and territorial governors to explain his action in Cambodia and discuss campus tensions.

May 13—Secretary of State Rogers declares that the U.S. will not become "militarily involved" to defend the government of Cambodia.

May 16—State Department officials reveal that the U.S. began to supply small arms to Cambodia secretly on April 25, 1970.

May 18—Laird declares that the U.S. and South Vietnam have carried out brief mis-

sions in Laos in the past but that no U.S. troops are engaged in ground combat in Laos at present.

Robert Finch, Secretary of Health, Education and Welfare, sends a message to 800 department employees declaring that he supports the President's actions in Cambodia.

May 20—It is announced in New Delhi that the U.S. has signed an agreement with India to give India \$86.6 million in rupees in 1970 for the financing of major development projects.

May 25—It is reported in Washington that on May 22 the State Department informed the Senate Foreign Relations Committee that it has decided to send about \$7.5-million worth of arms to Cambodia.

May 26—President Nixon welcomes Indonesian President Suharto to the White House and confers with him for 90 minutes.

The President meets with leaders of the construction trades and longshoremen's unions of New York and says he has found their demonstrations of support "very meaningful." (See also *Demonstrations and Unrest*.)

Government

(See also *Demonstrations and Protests*)

May 1—John N. Mitchell, Attorney General, declares that "irresponsible and malicious criticism" of the Supreme Court threatens constitutional liberties.

Speaking to a group of civilian employees at the Defense Department, President Nixon contrasts the U.S. soldiers in Southeast Asia, "those kids out there," whom he terms "the greatest," with what he describes as "these bums . . . blowing up the campuses."

May 5—The Federal Reserve Board cuts the margin requirements on stock purchases from 80 per cent to 65 per cent, effective May 6.

May 6—The President orders the Justice Department to prepare a full report on the fatal shooting of 4 Kent State University students by National Guardsmen on May 4. (See also *Demonstrations and Unrest*.)

A letter of protest from Secretary of the Interior Walter Hickel to President Nixon is unexpectedly made public; Hickel pleads with the President to confer with members of his Cabinet and warns that the administration is insensitive to American youth and is alienating young Americans.

May 9—Secretary of Health, Education and Welfare Robert Finch tells student demonstrators that the public remarks of California Governor Ronald Reagan and Vice President Spiro Agnew "contributed to heating up the climate in which the Kent State students were killed."

May 12—The Senate votes 94 to 0 to confirm Harry Andrew Blackmun, a Minnesota judge, as the 99th Justice of the Supreme Court, succeeding Abe Fortas, who resigned in May, 1969.

May 14—Secretary of Housing and Urban Development George Romney announces that the President will not divert funds from the Model Cities and other H.U.D. programs to finance his plans for school desegregation.

Secretary of Defense Melvin Laird, Under Secretary of State Elliot Richardson, and national security adviser Henry A. Kissinger meet with Republican Senators to warn that proposed legislation restricting funds for future U.S. involvement in Cambodia will impair the President's credibility abroad.

May 15—The President names Colonel Elizabeth P. Hoisington, director of the Women's Army Corps, and Colonel Anna Mae Hays, chief of the Army Nurse Corps, to the temporary rank of brigadier general. They will be the first U.S. women generals.

May 19—The President reveals that there will be small deficits in the federal budgets for fiscal 1970 and 1971, instead of the anticipated surpluses; the President asks Congress for a new tax on leaded gasoline to raise revenue and to help control pollution.

May 20—Speaker of the House John W. McCormack says he will retire from Congress at the end of this session.

May 21—Attorney General John Mitchell

warns the nation's law enforcement agencies "to keep their cool and to utilize only such minimum force as is required to protect the safety of the general public, the bystanders, and themselves."

The President signs legislation providing for user taxes and a commitment to spend more than \$5 billion in federal funds for modernization of the nation's aviation facilities over the next decade.

The President asks Congress for \$1.5 billion for financing the desegregation of Southern schools and incentives for integration of Northern schools over the next 2 years.

U.S. Commissioner of Education James E. Allen tells 400 employees of the Office of Education that he opposes the administration's policies in Indochina.

May 22—In Houston, Texas, Vice President Agnew again attacks administration critics; he compares campus rioters to enemy soldiers.

May 25—The Treasury asks Congress to raise the temporary federal debt ceiling to \$395 billion.

May 30—The resignation of Clark R. Moltenhoff as special counsel to the President is announced.

Labor

May 3—Wildcat strikers in the Cleveland local of the International Brotherhood of Teamsters vote to return to work, ending a 32-day stoppage.

May 4—After a 3-week strike of Los Angeles city teachers, the Board of Education agrees to accept the services of a mediator.

May 9—The president of the United Automobile Workers, Walter P. Reuther, is killed in an airplane crash.

May 18—A 108-day strike against National Airlines ends with an agreement giving ground personnel a 33 per cent raise over a 3-year period. The agreement must be ratified by the union membership.

May 22—Leonard Woodcock becomes president of the United Automobile Workers.

The New York Times and Typographical Union No. 6 tentatively agree on a new

contract providing for a 41.69 per cent wage increase over a 3-year period.

Military

(See also *Government*)

May 16—The U.S. Marine Corps announces that 4 marines will be tried for murder in connection with the deaths in February, 1970, of 16 Vietnamese civilians.

May 17—The first graduates of the first Naval ROTC unit ever established at a Negro college are commissioned at Prairie View A & M College in Texas.

Politics

May 4—Ohio Governor James A. Rhodes asks the Federal Bureau of Investigation to investigate the death of 4 students at Kent State University, and alerts the National Guard to stand by at Case Western University after demonstrations there. He has accused his opponent in the Senate primary contest of preferring to "coddle" students. (See also *Demonstrations and Unrest*.)

May 6—Representative Robert Taft, Jr., wins Ohio's Republican nomination for the Senate, defeating Governor Rhodes.

Supreme Court

(See also *Government*)

May 4—The Court rules 7 to 1 that it is not a violation of the Constitution for state laws to exempt church property from taxation.

May 18—The Court rules unanimously that the press cannot be held liable for reporting exaggerated charges leveled at public figures when the accusations are clearly "political hyperbole."

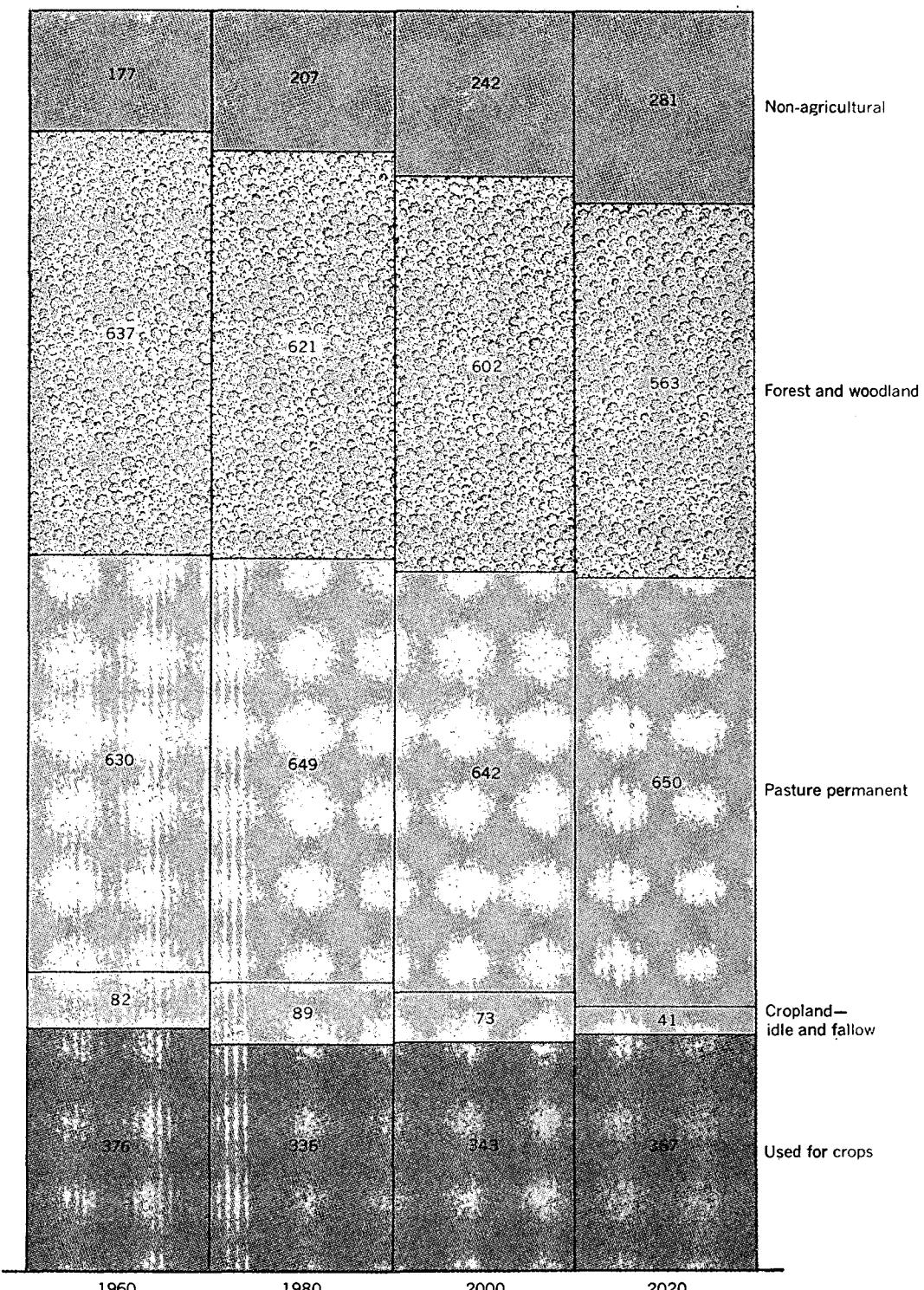
VIETNAM, REPUBLIC OF (South)

(See also *Intl. War in Indochina*)

May 5—The Supreme Court rules that Tran Ngoc Chau, an opposition member of the National Assembly who opposed the policies of President Nguyen Van Thieu, was illegally convicted by a military court March 5, 1970.

May 21—President Thieu asks the National Assembly for special powers for a 2-month period.

Projected Land Use, Conterminous United States, 1960-2020



Figures in million acres

Source: *The Nation's Water Resources*
Washington, D. C.: U.S. Government Printing Office, 1968.

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